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ABSTRACT

A report is presented on the evaluation and redevelopment of an 11-module course of instruction in restorative dentistry conducted under Project Acorde. The major learning goals for students were: acquisition of the necessary skills and knowledge of appropriate tools and materials; and self-appraisal of one's own work in performing the various restorations. Criteria were established for acceptable standards on the several characteristics of each restoration, and physical models of the restorations were produced to provide tangible examples of the criteria. The evaluation focused upon the sets of criteria to determine if the criteria were uniformly interpreted and applied in rating the quality of student's restorations. Student, instructor, and outside observers rated the student restorations as correct, improvable, or unacceptable. The degree of uniformity of interpretation and application of the criteria was analyzed in terms of agreement in ratings of each restoration by each pair of raters. Field test data clearly indicate that the rating criteria provide high agreement on the rating of student restorations between students, instructors, and observers. In addition to self-evaluation and instructor evaluation for each module, two tests and a final examination were administered. Criteria for evaluation of restorations, sample written tests, and interrater reliabilities are presented in appendices. (SW)

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PROJECT ACORDE

FINAL REPORT

Contract No. N01 DH 34030

Marjorie L. Kelley
Project Director

October 31, 1974

HE 011 929

FAR WEST LABORATORY FOR EDUCATIONAL RESEARCH AND DEVELOPMENT
1855 Folsom Street, San Francisco CA 94103

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SECTION

I

Letter to the Project Officer

October 31, 1974

Martin L. MacIntyre, D.D.S.
Project Officer
Curriculum Research and Development Section
Division of Dentistry
Department of Health Education & Welfare
Federal Building, Room 204
Bethesda, MD 20014

Dear Doctor MacIntyre:

This letter and the accompanying documents constitute the final report for the evalution and redevelopment of the Project ACORDE Restoration Modules.

Overall Summary of Production and Organization

The original contract with the FWL was for the evaluation of prototype instructional materials produced by three dental schools. At the outset of the contract there were only a few sets of slides and a few motion pictures produced. No written materials nor evaluation procedures were available.

For a number of reasons it was felt that a preliminary field test should be held in April of 1973, to test a few of the products from each of the production schools. This field test was held and a report made to the project officer and the production schools. A copy of that report and a suggested course of action is included with this report.

Following the report, the FWL was asked to participate for the revision of work done by the three production schools in cooperation with the Dental Health Center. An extension of the contract followed, and the then completed prototype instructional materials were revised, based upon a new instructional design. Details of the instructional design are contained in the Project ACORDE Restoration Modules, pages 3-7.

The following is a list of completed modules:

- Module 1, Orientation to the Course
- Module 2, Restoration of a Class I Facial Pit Cavity Preparation with Amalgam
- Module 3, Isolation of a Class V Facial Lesion with a Gingival Retractor
- Module 4, Restoration of a Class V Facial Cavity Preparation with Amalgam
- Module 5, Restoration of a Class V Facial Cavity Preparation with Unfilled Resin
- Module 6, Restoration of a Class III Distal Cavity Preparation with Silicate Cement
- Module 7, Restoration of a Class III Mesial Cavity Preparation with Filled Resin
- Module 8, Restoration of a Class IV Mesio-Incisal Cavity Preparation with Filled Resin
- Module 9, Restoration of a Class III Disto-Lingual Cavity Preparation with Amalgam
- Module 10, Restoration of a Class I Occlusal Cavity Preparation with Amalgam
- Module 11, Temporary Restoration of a Class II Mesio-Occlusal Cavity Preparation with Zinc Oxide-Eugenol
- Module 12, Restoration of a Class II Mesio-Occlusal Cavity Preparation with Amalgam
- Module 13, Restoration of a Class I Occluso-Lingual Cavity Preparation with Amalgam
- Module 14, Restoration of a Class V Disto-Facial Cavity Preparation with Amalgam
- Module 15, Restoration of Extensive Class II Cavity Preparations with Amalgam

Each module is supported by a written module for the student, an instructor's guide, a motion picture, a set of models, and evaluation instruments. (Actually, more modules were prepared than were called for in the contract.)

An extensive (list) evaluation program was carried out and is reported in a separate and accompanying document.

In reviewing the organizational structure and the mode of operating in the redesigning and revision of the final version of the instructional materials, it can be said that the mix of talents combined for this operation was an excellent one.

At the risk of over simplifying the case, it is clear that the dental schools have made a unique contribution to the project in the delineation of dental procedures--the Task Analysis; that is in getting down on paper the steps, instrumentation, and rational of specific procedures. They were less successful in specifying criteria; it took the educator to establish the systems. It was equally clear that professional educators were needed to develop the educational design, to translate the Task Analysis into instructional materials, to select appropriate media, clarify evaluation criteria and to test the materials in an educational setting.

In the development of the materials, constant contact was maintained between the educational and dental personnel. The Dental Health Center provided a great deal of dental expertise and maintained a laison with members of the Task Analysis Committee. Keeping a broad base of dental expertise through a Task Analysis Committee is, I believe, essential for the excellence, acceptance, and use of the instructional materials.

When the prototype materials were completed, NMAC produced the final version of the motion pictures. While the final product is of excellent quality, my feeling is that the work could have been completed more efficiently in a shorter period of time by a contractor. Commuting and communicating from California to Georgia is expensive in human effort as well as financial effort. The quality of the printed materials is satisfactory; however, many small improvements would have been possible, had the contractor been working with a local, private typesetter and printer.

While I feel that a broad base of dental personnel was essential to the successful production of the Project ACORDE Modules, I think a smaller, local production group would prove to be cost effective when the creative part is completed and the production of the final version of the materials begins.

One major area in the production cycle, in my opinion, has been left out - the dissemination phase. No plan yet exists to implement these materials; without a plan, without funds to support the plan, this excellent product probably will not serve the noble purposes for which it was designed. I strongly recommend that a plan be devised and implemented.

It was indeed a pleasure meeting and working with members of the dental school faculties and the staff of the Dental Health Center.

Sincerely,

Robert L. Brunelle
for

Marjorie L. Kelley, Ed.D.
Project Director

MLK:jk

SECTION

II

Final Evaluation Report

PROJECT ACORDE

FINAL EVALUATION REPORT

Marjorie L. Kelley
Project Director

October 31, 1974

FAR WEST LABORATORY FOR EDUCATIONAL RESEARCH AND DEVELOPMENT
1855 Folsom Street, San Francisco CA 94103

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INTRODUCTION

Project ACORDE has produced a 15-module course of instruction in Restorative Dentistry. This course of instruction stems from a series of task analyses, which resulted in concensus among dental school representatives as to various operative dentistry procedures. Development of the course in conformity with the task analyses, along with agreement among dental school representatives as to the procedures in which students must be trained, makes it reasonable to expect the course to be acceptable to a vast majority of dental schools.

The potential for widespread adoption of the course increases the developer's responsibility for rigorous evaluation. The field test must indicate demonstrable high quality of the course if it is to be made generally available to the dental profession.

Preliminary field testing of prototype course materials afforded the developers with direct observation of a student's learning problems. Suitable, needed revisions were incorporated in the course materials used for the field test which generated the data presented and analyzed in this report. Evaluation was performed on the 11 basic modules only.

EVALUATION PLAN

Evaluation processes were carefully embedded in the instructional design. The criteria for evaluation of each module's restoration were related to students by written, visual, tactile, and verbal means in instructional materials, films, discussions, and, especially, by the use of models. Using the criteria for each module (as exhibited in Appendix A), each student evaluated his own restoration. This, in action, was one of the fundamental precepts of the course--that, ultimately, the dentist must evaluate his own work. Ratings given were: C = correct; I = incorrect, but improvable to C; X = incorrect, but not improvable.

After the student had made his initial, independent evaluation of his restoration, the instructor made his independent evaluation. Then, the ratings were compared. Out of a difference in evaluation arose the "teachable moment"--an opportunity to review understanding of the criteria, use of material or instruments, perception of problems, and application of the criteria to the restoration being evaluated. The student then proceeded to another trial, after which the same evaluation process took place.

Both instructor and student, in the classroom setting for evaluation, were looking for conformity with the models; both observed the teeth in the dentaform.

Instructional design called for two trials by each student. Some students, however, went on to a third and fourth and even a fifth trial on a given restoration to project their skills. In addition, after the completion of each module, the teeth and models were sent to independent evaluators. (All through the activities of Project ACORDE these independent evaluators were referred to as "observers" by project staff, instructors, and students. Throughout the remainder of this report the "observer" references the independent evaluators.) These observers knew that they were to base their ratings of the restorations on the degree of conformity to the models, as had been done by the instructors and students.

Determination of the effectiveness of the course of instruction, and the course materials, rests upon two factors: (1) uniformity of interpretation and application of criteria, by different raters, in the rating of restorations, and (2) student success in the course. These two factors are not independent, however. Both student and instructor are included in the group of different raters among whom it is deemed important to have uniformity of interpretation and application of the restoration criteria; ratings by the instructor eventually determine student success in the course. The ultimate indicator of course effectiveness is a strong, positive relationship between instructor-student rating agreement and student success in the course.

Uniformity of interpretation and application of criteria must be examined in terms of the ratings given by all raters to determine whether the situation in which the rating is done makes a difference in the ratings given.

Test Restoration and Written Tests

In addition to self- and instructor evaluation within each module, two tests and a final examination were administered.

Modules I-II

To assess learning from modules I and II, students were required to place a restoration in a Class I Facial Pit Cavity Preparation for tooth # 19/36. Students evaluated themselves and were evaluated by their instructors and observers on three restoration characteristics: carving, finishing, and polishing. Only one observer made a rating on each restoration characteristic. Criteria sheets used to rate the restorations are shown in Appendix B. The written test is found in Appendix C.

Modules III-VI

As a test of learning in modules III-VI, students were required to restore a Class V Cavity Preparation restored with unfilled resin on tooth # 6/13. Ratings were based on the categories of finishing and occlusion, using the C, I, and X grades as before. Appendix D contains the criteria sheets used to rate the restoration. The written test (see Appendix E) included nine questions which pertain to the material covered in modules III-VI.

Final Examination

For the final examination, students were required to place three restorations: a Class I occlusal cavity preparation on a pre-prepared tooth # 30/46, a Class II mesio-occlusal cavity preparation on a pre-prepared tooth # 3/16, and a Class III disto-lingual cavity preparation in a pre-prepared tooth # 6/13 with filled resin. Students and instructors rated the restorations as before; one observer gave ratings. Appendix F contains criteria sheets used to rate there restorations.

Sites and Groups

Field testing of the instructional materials in this course was conducted at four institutions:

University of Washington
Eastern Washington
Clark College
Haskell Indian School Center.

Among the 70 students were some who were in the school program to become dentists and others who were training as dental assistants. The field test population is identified in Table 1, by site and type of training program.

Table 1

Field Test Sites and Population

School/Location	Students	
	Number	Program Type
University of Washington Seattle, Washington	10 10	dentist dental hygienist
Eastern Washington Spokane, Washington	20	dental hygienist
Clark College Vancouver, Washington	20	dental hygienist
Haskell Indian School Center Lawrence, Kansas	10	dental assistants

Field Testing Characteristics

Time for Course Administration

The course was administered in basically the same time span at all sites. At the University of Washington, the groups met every Saturday and spent all day on one module. Any other work was done on the student's own time. At Eastern Washington, one group met twice weekly for four hours each time; the other group met six hours each Wednesday and two hours on Thursday. The Clark College group met on Saturdays and took about as much time overall as Eastern Washington.

The University of Washington groups finished the course fastest; they had a limited period of time in which to work and never did more than two restorations per module.

Instructors

At the University of Washington, dental instructors and dental assistant instructors worked as a team in administering the field test of all modules with both groups of students. At the other field test sites, only the regular program instructors were involved in administration of the field test.

Observers

For the early modules, one observer was from the Dental Health Center; the other observer was from the University of the Pacific. On later modules, the two observers were from the University of the Pacific; however, the observers were not necessarily the same two individuals from module to module.

Field Test Data

Field test data collected at all four institutions include:

1. a minimum of two restorations completed by each student for each of the 11 instructional modules which were evaluated by:
   (a) the student,
   (b) the instructor,
   (c) a dentist from the Dental Health Center in San Francisco, and
   (d) an operative dentistry instructor from the University of the Pacific;
2. test restorations which covered Modules I-II and Modules III-VI;
3. a final test which covered all of the material;
4. evaluation forms completed by the students which assessed their reactions to various aspects of the course;
5. similar types of forms completed by the instructors.

In addition, a trained observer was present at one of the four test sites. The Project Director visited three of the four test sites from time to time in order to supplement the formal statistical data with first-hand observations and interviews with students and faculty members. (As noted earlier, data from the field testing at Haskell Indian School Center are not included in the analysis.)

Analytical Considerations

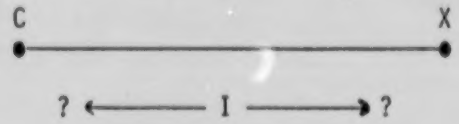
Evaluation of this course requires the sharpest focus upon the agreement between pairs of raters in giving C, I, or X ratings to the restorations.

It is these ratings which represent the rater's interpretation and application of the criteria for a given restoration.

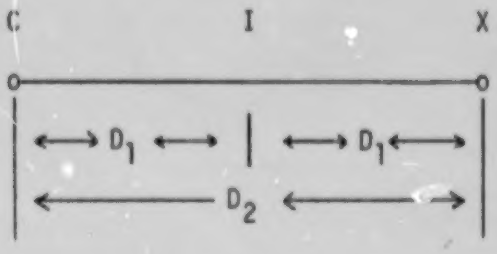
Differences between modules, student goals (dentists, dental hygienists), instructional approaches (team, individual), and the lack of continuity of observers through all modules predicate an analysis by module, by field test site, by student group.

Severe limitations are imposed by the data. First, the small student n in the field test groups (minimum-10, maximum-19) is especially critical. The available pairs of ratings are even fewer in number since all restorations were not rated by all raters. The small number of pairs of ratings does not preclude analysis by finding the correlation between the ratings given by pairs of raters or by the use of chi-square. In either case, however, the derived statistic is subject to wide variability--and thus to subsequent overinterpretation--by the variation in a single element of data. Therefore, a straight forward analysis in terms of percentage of agreement between raters was selected to indicate the reliability of ratings--and, indirectly, the consistency of interpretation of the criteria.

Another limiting factor in the analysis is the nature of the rating scale. Strictly speaking, the C, I, and X ratings are ordinal.



The probability of the scale having equal intervals (CI = IX), in the perception of all raters, in virtually nil. For the initial, cursory review of the data, though, it will be useful to consider, by pairs of raters, not only the agreement in ratings but the differences as well. These differences initially will be reduced to D_1 and D_2, as depicted below.



Agreement between raters will be assumed for those cases in which a restoration was assigned the same rating by each rater; D_1 occurs when the pair of ratings is either C,I or I,X; D_2 is represented only by the C,X pair of ratings.

Practicality in the real world of dentistry leads to another important perspective for consideration of the rating data. For the practicing dentist, a restoration that must be completely redone is a failure--rated X. If it is possible to improve the restoration to meet the criteria then the restoration effort has not been a total loss; improvable--rated I. With this in mind, later analysis of the ratings will give consideration to the reconcilable nature of the C,I pairs of ratings. The same argument cannot be advanced for the I,X pair of ratings.

Lastly, the level of agreement between raters will be considered to be "High" if 2/3, or more, of the pairs of ratings are alike (CC, II, or XX); if less than 2/3 of the pairs of ratings are alike, the level of agreement will be considered to be "Low." In percentages, we will interpret 67%, or higher, as "High."

EVALUATION RESULTS

Module Restorations

The major emphasis of this report is upon the degree to which the rating criteria were interpreted and applied uniformly by all raters to the rating of restorations performed during each module of instruction. The report on student success is implicit in the tables presented; however, the explicit findings are reported in the Instructor's Manual, page 353.

Student success on each module is indicated, to some degree, by comparing the ratings given by both the instructor and the student, on successive trials, and the percentage of agreement between them.

The instructional design should bring forth agreement between raters, regardless of the quality of performance by the student in making the restoration being rated. While the level of agreement is discussed at length later, it is interesting to note that there are only three modules in which a seemingly disproportionate number of "X" ratings were made: Modules II, VI (Trial 1), and Module IXa, as shown in Tables 3, 7, and 10, respectively. In regard to Module IXb (Table 11), it should be noted that these restorations were not rated, at the University of Washington; with two groups missing, the frequencies are lower than found in the tables on other modules.

Table 2

Summary of Ratings and Percentage of Agreement
All Groups, Module 1

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	35	33	47	39
I	16	19	6	9
X	7	6	4	8
Trial 2				
C	32	31	40	38
I	14	13	11	13
X	6	8	7	4
Trial 3				
C	23	23	26	24
I	7	5	2	5
X	1	3	2	3
Trial 4				
C	6	5	6	6
I	2	2	3	3
X	-	1	-	-
Trial 5				
C	2	2	3	1
I	1	1	-	1
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	64	55	48	47	48	72
Trial 2	84	45	52	43	47	74
Trial 3	88	64	56	62	53	78
Trial 4	67	56	56	67	67	100
Trial 5	100	67	33	67	33	67

Table 3

Summary of Ratings and Percentage of Agreement
All Groups, Module II

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	18	19	16	-
I	7	10	7	21
X	27	26	8	8
Trial 2				
C	32	25	21	4
I	10	21	9	27
X	11	9	6	1
Trial 3				
C	20	22	9	-
I	2	5	4	10
X	9	6	4	1
Trial 4				
C	11	13	5	2
I	-	2	4	6
X	1	-	4	-
Trial 5				
C	10	9	7	2
I	2	1	-	5
X	-	1	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	67	47	25	47	31	22
Trial 2	53	61	40	56	40	30
Trial 3	65	53	00	52	00	18
Trial 4	69	46	23	23	23	30
Trial 5	82	70	14	85	14	29

Table 4

Summary of Ratings and Percentage of Agreement
All Groups, Module III

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	35	27	14	12
I	15	21	22	20
X	4	9	11	6
Trial 2				
C	36	35	11	12
I	12	12	40	41
X	2	5	4	2
Trial 3				
C	15	16	6	5
I	2	4	10	13
X	1	-	1	1
Trial 4				
C	1	2	-	-
I	-	-	2	1
X	-	-	-	-
Trial 5				
C	-	-	-	-
I	-	-	-	-
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	70	41	39	48	36	81
Trial 2	71	83	38	38	38	84
Trial 3	85	18	25	23	25	76
Trial 4	50	00	00	00	00	50
Trial 5	-	-	-	-	-	-

Table 5

Summary of Ratings and Percentage of Agreement
All Groups, Module IV

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	39	41	28	29
I	7	5	22	21
X	7	5	9	9
Trial 2				
C	41	41	28	35
I	5	4	22	19
X	6	6	9	5
Trial 3				
C	25	24	15	12
I	4	3	10	14
X	2	2	7	6
Trial 4				
C	8	8	3	3
I	2	1	13	9
X	1	2	1	5
Trial 5				
C	3	3	3	1
I	-	-	1	3
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	81	44	49	46	47	95
Trial 2	78	51	63	48	56	81
Trial 3	90	47	36	47	36	80
Trial 4	82	24	24	18	29	65
Trial 5	100	50	25	50	25	50

Table 6

Summary of Ratings and Percentage of Agreement
All Groups, Module V

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	45	45	37	44
I	2	4	11	5
X	10	8	10	9
Trial 2				
C	45	47	41	44
I	3	3	8	6
X	9	6	8	8
Trial 3				
C	14	12	8	9
I	-	-	5	1
X	-	1	1	3
Trial 4				
C	3	2	4	2
I	1	1	1	-
X	1	-	-	-
Trial 5				
C	-	-	-	-
I	1	-	-	-
X	-	-	1	1

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I, S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	91	71	81	72	83	83
Trial 2	84	67	74	66	71	93
Trial 3	86	57	71	50	71	71
Trial 4	67	40	40	40	40	80
Trial 5	00	00	00	00	00	100

Table 7

Summary of Ratings and Percentage of Agreement
All Groups, Module VI

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	32	30	12	20
I	10	11	32	25
X	10	12	12	12
Trial 2				
C	33	41	14	21
I	16	7	34	27
X	4	4	8	7
Trial 3				
C	11	13	5	6
I	3	-	11	11
X	1	3	-	1
Trial 4				
C	1	2	-	1
I	-	1	3	2
X	-	-	-	-
Trial 5				
C	-	1	-	-
I	-	-	-	-
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	65	33	32	27	27	88
Trial 2	58	35	38	25	38	80
Trial 3	69	26	32	26	8	84
Trial 4	33	00	00	25	25	25
Trial 5	00	00	-	00	-	-

Table 8

Summary of Ratings and Percentage of Agreement
All Groups, Module VII

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	29	31	16	22
I	13	11	24	18
X	7	8	6	6
Trial 2				
C	34	38	14	25
I	12	9	28	15
X	4	3	3	5
Trial 3				
C	11	12	3	5
I	8	6	11	8
X	1	1	2	3
Trial 4				
C	5	4	-	2
I	-	-	3	1
X	-	-	1	1
Trial 5				
C	-	-	-	-
I	-	-	1	1
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	64	37	34	26	45	85
Trial 2	76	36	32	40	41	71
Trial 3	55	31	20	31	25	63
Trial 4	80	00	50	00	50	50
Trial 5	-	00	-	00	-	100

Table 9

Summary of Ratings and Percentage of Agreement
All Groups, Module VIII

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	32	32	6	27
I	13	10	33	9
X	-	4	1	3
Trial 2				
C	35	36	16	16
I	13	9	24	24
X	2	2	-	-
Trial 3				
C	16	13	2	5
I	4	4	6	4
X	-	-	-	-
Trial 4				
C	7	6	-	3
I	2	2	4	1
X	1	-	-	-
Trial 5				
C	-	-	-	1
I	-	-	-	-
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	65	36	57	20	55	56
Trial 2	66	40	32	21	30	70
Trial 3	75	75	25	62	25	33
Trial 4	80	90	00	50	00	00
Trial 5	-	-	00	-	00	-

Table 10

Summary of Ratings and Percentage of Agreement
All Groups, Module IXa

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	34	35	9	31
I	7	6	30	5
X	10	11	15	7
Trial 2				
C	34	33	7	37
I	9	7	35	10
X	8	9	11	2
Trial 3				
C	8	9	-	10
I	9	4	16	6
X	3	4	6	-
Trial 4				
C	6	5	-	4
I	1	-	4	2
X	2	3	6	1
Trial 5				
C	1	1	-	-
I	-	-	-	-
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I, S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	82	26	62	26	62	20
Trial 2	77	24	55	26	52	10
Trial 3	58	60	38	41	31	29
Trial 4	56	25	71	25	57	25
Trial 5	100	-	-	-	-	-

Table 11

Summary of Ratings and Percentage of Agreement
All Groups, Module IXb

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	27	29		
I	5	3		
X	2	2		
Trial 2				
C	30	29		
I	2	1		
X	1	-		
Trial 3				
C	3	3	THESE RESTORATIONS	
I	-	-	WERE NOT RATED	
X	-	-	BY THE OBSERVERS	
Trial 4				
C	No	No		
I	Data	Data		
X				
Trial 5	No	No		
C	Data	Data		
I				
X				

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	82					
Trial 2	88					
Trial 3	100					
Trial 4	-					
Trial 5	-					

Table 12

Summary of Ratings and Percentage of Agreement
All Groups, Module X

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	35	39	26	33
I	14	9	23	16
X	2	5	6	5
Trial 2				
C	42	44	34	37
I	8	5	20	16
X	1	3	1	1
Trial 3				
C	9	13	11	9
I	5	1	6	6
X	-	-	-	-
Trial 4				
C	3	2	-	-
I	-	-	5	4
X	-	-	-	-
Trial 5				
C	-	-	-	-
I	-	1	-	-
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I, S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	70	50	55	40	45	67
Trial 2	81	60	60	55	60	76
Trial 3	71	44	44	50	39	67
Trial 4	67	20	20	00	00	85
Trial 5	00	-	-	-	-	-

Table 13

Summary of Ratings and Percentage of Agreement
All Groups, Module XI

Summary of Ratings

Trial Ratings*	Rater			
	Instructor (I)	Student (S)	Observer (O_1)	Observer (O_2)
Trial 1				
C	38	40	39	41
I	6	2	9	9
X	5	6	6	1
Trial 2				
C	43	47	40	44
I	6	2	13	9
X	1	1	1	-
Trial 3				
C	6	10	9	11
I	4	1	6	4
X	2	2	1	-
Trial 4				
C	-	-	1	1
I	-	1	2	2
X	1	-	1	-
Trial 5				
C	-	-	-	-
I	-	-	-	1
X	-	-	-	-

* C = Correct, I = Improvable to C, X = Incorrect

Percentage of Agreement

Trial	Pairs of Raters					
	I,S	I, O_1	I, O_2	S, O_1	S, O_2	O_1, O_2
Trial 1	82	65	60	70	69	85
Trial 2	84	63	70	70	72	85
Trial 3	67	46	27	54	45	82
Trial 4	00	00	00	00	00	100
Trial 5	-	-	-	-	-	-

Focusing upon the reliability of ratings required analysis of the ratings given to each of the two required trial restorations, in each module, of each group of students. Ratings were made by the instructor, the student, and two observers. Ratings by all possible pairs of raters were examined to determine the percentage of agreement between each pair of raters. Table 14 displays the percentages of agreement between pairs of raters on the Trial 1 and Trial 2 restorations for each module for each group of students in the field test.

The percentages in Table 14 are extracted from the basic rating data presented in Appendix G: interrater reliabilities--percentage of agreement--and summary of ratings, tabled by module by field test group. Appendix G tables show not only the frequency and percentage of rater-pair agreement (A), but also the frequency and percentage of disagreement by level of disagreement (D_1 = disagreement by one rating unit, C,I or I,X; D_2 = disagreement by two rating units, C,X).

Table 14

Percentage of Rater Agreement by Group, by Module, by Trial: Modules I through VI

Group/ Rater Pair	Module and Trial											
	I		II		III		IV		V		VI	
	1	2	1	2	1	2	1	2	1	2	1	2
Eastern Washington -- Group 1												
I, S	80	100	50	80	89	88	90	60	90	78	90	67
I, O_1	70	70	56	56	33	38	40	40	50	33	20	10
I, O_2	50	60	*	22	44	50	40	60	60	50	20	20
S, O_1	60	70	56	78	22	25	30	30	50	13	30	0
S, O_2	60	60	*	33	33	38	30	50	70	33	30	0
O_1,O_2	80	70	*	44	89	88	100	80	60	89	100	80
Eastern Washington -- Group 2												
I, S	70	67	67	40	70	89	78	78	80	90	67	50
I, O_1	40	44	*	86	50	44	33	50	90	50	38	40
I, O_2	30	56	*	*	33	33	33	60	90	70	44	30
S, O_1	50	44	*	43	40	56	33	44	50	60	13	20
S, O_2	50	56	*	*	67	44	33	56	70	60	22	30
O_1,O_2	60	89	*	*	78	78	100	70	80	80	100	90
University of Washington -- Group 1												
I, S	50	75	88	44	80	80	80	89	90	90	40	67
I, O_1	56	25	25	67	60	70	60	70	80	80	50	50
I, O_2	33	38	63	57	60	70	50	60	80	80	40	70
S, O_1	22	38	22	33	80	70	70	78	90	90	50	22
S, O_2	33	50	63	57	80	50	60	67	90	90	40	44
O_1,O_2	75	70	33	50	80	80	90	90	100	100	90	60
University of Washington -- Group 2												
I, S	60	80	60	50	75	75	70	100	100	90	78	50
I, O_1	50	60	70	60	50	25	50	60	70	80	11	33
I, O_2	50	80	33	40	50	25	50	70	90	80	22	63
S, O_1	50	60	70	70	67	22	60	60	70	70	30	33
S, O_2	50	60	44	50	56	22	60	70	90	70	30	63
O_1,O_2	100	70	33	20	90	90	100	90	80	100	60	78
Clark College												
I, S	75	77	100	62	65	79	100	92	100	94	85	79
I, O_1	69	47	-	-	35	29	71	62	88	88	50	43
I, O_2	80	62	-	-	31	33	86	92	88	88	43	50
S, O_1	53	43	-	-	44	31	67	62	89	94	36	47
S, O_2	75	54	-	-	39	25	83	77	89	94	29	53
O_1,O_2	65	81	-	-	89	88	89	79	100	100	94	94

Table 14
(con't)

Percentage of Rater Agreement by Group, by Module, by Trial: Modules VII through XI

Group/ Rater Pair	Module and Trial											
	VII		VIII		IXa		IXb		X		XI	
	1	2	1	2	1	2	1	2	1	2	1	2
Eastern Washington -- Group 1												
I, S_1	90	89	78	90	90	100	78	100	100	100	89	90
I, O_2	20	22	22	10	10	30	-	-	50	90	67	60
I, O_1	30	50	22	20	33	30	-	-	50	90	67	50
S, O_2	30	11	Ø	Ø	10	30	-	-	50	90	67	50
S, O_1	40	38	Ø	10	33	30	-	-	60	80	67	67
O_1,O_2	90	75	100	90	56	10	-	-	90	90	80	89
Eastern Washington -- Group 2												
I, S_1	50	70	50	60	90	70	70	67	70	90	100	80
I, O_2	*	*	40	40	30	40	-	-	40	40	70	70
I, O_1	*	*	70	50	63	25	-	-	70	30	75	100
S, O_2	*	*	10	20	30	40	-	-	50	50	67	70
S, O_1	*	*	40	30	75	25	-	-	80	40	75	80
O_1,O_2	*	*	40	50	38	13	-	-	70	70	88	70
University of Washington -- Group 1												
I, S_1	50	83	*	50	100	71	-	-	56	63	75	78
I, O_2	50	83	57	50	22	38	-	-	67	75	88	78
I, O_1	50	67	57	88	88	63	-	-	56	50	88	78
S, O_2	38	71	17	17	33	50	-	-	50	67	75	78
S, O_1	44	86	33	50	86	57	-	-	60	67	75	78
O_1,O_2	100	70	50	70	13	11	-	-	60	80	100	100
University of Washington -- Group 2												
I, S_1	63	90	80	70	50	80	-	-	60	70	50	90
I, O_2	63	40	40	60	30	10	-	-	60	70	50	80
I, O_1	63	50	80	70	60	80	-	-	60	70	50	90
S, O_2	38	50	60	50	20	10	-	-	40	60	100	90
S, O_1	63	60	60	40	70	80	-	-	50	60	90	100
O_1,O_2	78	70	40	50	Ø	Ø	-	-	60	80	90	90
Clark College												
I, S_1	69	71	82	73	100	91	93	100	75	85	100	100
I, O_2	46	27	-	-	42	17	-	-	60	55	83	100
I, O_1	39	71	-	-	86	82	-	-	60	91	91	90
S, O_2	23	43	-	-	39	25	-	-	36	36	83	91
S, O_1	23	64	-	-	86	89	-	-	27	73	91	80
O_1,O_2	81	73	-	-	25	17	-	-	71	71	92	92

* insufficient data, fewer than 6 pairs of ratings available

Ø zero agreement

- no data

Another consideration is the method used to arrive at the final ratings for each student on a module. If a student received a *C* by a given rater on each criterion in the module, he received an overall rating of *C* by that rater for that module. If the rater gave even one *I*, the student's overall score from that rater for that module was *I*. Similarly, if the rater gave even one *X*, the student's overall score from that rater for that module was *X*.

In examining Table 14, attention must be given to the * entries which indicate that the percentage of agreement between raters was determined by fewer than six (6) pairs of ratings. So few pairs of ratings were deemed to be insufficient data upon which to base consideration of reliability between raters; variation of a single rating would cause fluctuation of 20%, or more, in the percentage of agreement.

Both groups at the University of Washington were taught in the same class by a team of four instructors--two dentists and two hygienists. All instructors gave ratings. The low reliabilities for Group 2, the dental hygiene students, may have been due to their not being as well prepared as the dental students for the present course. The dental students already had one year of dental study; their preliminary activities may have given them some skills which the dental hygiene students did not possess, especially regarding the visual criteria. The instructors admittedly did not use the models in the class as suggested in the educational design; also, there was little discussion of models and criteria in class. The models were simply on display and available for visual and tactile study.

One observation about the percentages of agreement which needs some discussion is the fact that all rating comparisons except the I-S and O-O comparisons yield generally low percentages of agreement. This is undoubtedly partly due to the different conditions under which the restorations were observed and rated. Observers rated the restorations out of the dentaform and probably often under better light. On some criteria, then, they had better evidence for making their ratings. About one-half of the criteria could not be rated by the observers, since they were only temporarily observable to instructors and students and were then covered up. Clearly, it would be better if the observers could be at the educational site; the restoration would be seen under the same conditions by all raters. As it was, there was no interaction of observers with instructors or students, but the observers from the University of the Pacific did interact with each other, which may have increased their percentages of agreement.

Another problem is the lack of objectivity (humanness) of observers and instructors. Even though the observers were told to base their ratings on the degree of conformity to the models, some intervening variables were undoubtedly present. For instance, an instructor might be subjective in rating and giving a higher grade on the second trial to a student he knew had been trying hard to improve.

The lack of a clear definition of the X rating at the beginning of the program may also be a source of the variation in ratings. The first modules were generally easier, so the number of X's given may have been relatively low. However, there was some confusion about the occasion for giving an X to a restoration. Finally all raters were told that if the restoration was unimprovable to the point that it would have to be removed and redone, charging the client, the restoration was unacceptable and should be rated as X. Thus, all raters were able to use the X rating more consistently in the later modules.

To compute the reliability percentages in Table 14, each group of students was considered separately for each module, and each examination. This provides a more accurate picture of the data, since the instructors for each group were different, the students were different, and the observers were different. Analyzing the data by groups of students implies that all ratings in the "student" category were arrived at by a uniform interpretation and application of the criteria, which may not be true.

Several general statements should be made about individual modules and groups before the patterns of reliabilities are discussed for all modules. There is an unusually low number of rating comparisons possible for Module II (especially at Eastern Washington) and Module VII (especially at Eastern Washington, Group 2). Refer to Tables 27-31 and 52-56 in Appendix G.

Though the number of comparisons for the Clark College group (see all tables for Clark College in Appendix G) could be 19 in any one cell (Trial 1 or 2, any set of raters), the n was rarely that high because attendance at class was unusually low for this group. Five students eventually dropped the course and did not take the final examination. Three of these did not take the examination over Modules III-VI. Most of the dropouts left sometime after completing Module VII; one student worked only through Module V. These students were all dental hygienists coming back for retraining; their commitment to the program seems to have been low, and so they lacked motivation in completing the module series.

Observer ratings were not obtained for Clark College on Modules II, VIII, and IXb, so reliabilities are computed only for the instructor-student comparisons.

Patterns of Agreement on Modules

Table 14 reveals generally high percentages of agreement between ratings of instructors and students and between the ratings of the two observers for all modules and all groups; all other rating comparisons yield generally low reliabilities. However, even the instructor-student (I-S) and observer$_1$-observer$_2$ (O_1-O_2) reliabilities are low in a number of cells in the table. In order to better pinpoint reliability problems in the modules or groups, these cells were examined more carefully.

For each module, by group, the percentages of agreement on Table 14 were viewed as falling into one of six patterns. Each pattern has possible implications for interpretations about the use of the criteria by the raters.

Using either an "H" for "high agreement" (67% or higher) or an "L" for "low agreement" (less than 67%), each of the 6x2 cells in Table 14 can be converted to a 2x2 cell in which I-S and O_1-O_2 percentages of agreement have been replaced by the appropriate "H" or "L" indicator of the level of agreement. For example, such conversion of the percentages of agreement on Module I for Eastern Washington, Group 1, results in what must be considered an ideal pattern of agreement. Instructor and students are in high agreement on their rating of both trial restorations; both observers are also in high agreement on both trial restorations. This specific conversion from percentages of agreement to a pattern of agreement is illustrated below:

	Trial 1	Trial 2
I, S	80	100
I, 0_1	70	70
I, 0_2	50	60
S, 0_1	60	70
S, 0_2	60	60
0_1, 0_2	80	70

	Trial 1	Trial 2
I-S	H	H
0_1-0_2	H	H

A brief, general interpretation of the associated criteria usage characteristics accompanies the following display of the six (6) pattern types possible:

1.	HH				Consistent
	HH				Setting-free
					(school setting,
					observers' setting)
2.	A	B	Reversals (RH)		
	LH	HH	HL	HH	Learned consistency
	HH	LH	HH	HL	Setting-dependent
3.		Reversals (RL)			
	LH	LH	HL		Learned consistency
	LH	HL	LH		Setting-free
4.	LL	HH			Inconsistent
	HH	LL			Setting-dependent
5.	A	B	Reversals (RL)		
	LH	LL	HL	LL	Inconsistent
	LL	LH	LL	HL	Setting-dependent
6.	LL				Inconsistent
	LL				Setting-free

Pattern 1: This is the ideal pattern, with all reliabilities high. Criteria usage was consistent for both I-S and O_1-O_2 from Trial 1 to Trial 2.

Pattern 2: Three of four reliabilities here are high. Pattern 2A seems logical in that the percentage of agreement for I-S might well increase from Trial 1 to Trial 2; the instructor could spot problems on Trial 1, teach better use of the criteria, and then observe student performance on Trial 2. Both instructor and student would gain clearer understanding of the criteria between Trials 1 and 2. Since the O_1-O_2 comparison yielded a high percentage of agreement on both trials, criteria usage is said to be 'setting-dependent'; there were different reliabilities in the two settings (school or observation setting).

Pattern 3: Raters in both settings would have learned better criteria usage.

Pattern 4: In one setting the reliability is high, in one it is low; improvement does not take place from Trial 1 to Trial 2.

Pattern 5: The pattern indicates that in one setting the reliability is low on both trials. In the other setting, the criteria are either learned, and the reliability increases from Trial 1 to Trial 2, or no learning occurs (RL type) and the reliability decreases from Trial 1 to Trial 2.

Pattern 6: This pattern would indicate that the criteria were used inconsistently in both settings.

All module reliabilities for I-S and O_1-O_2 on Table 14 were coded according to these patterns. The conversion results are shown in Table 15.

Table 15

Patterns of Rater Agreement
by Field Test Site/Group, All Modules

Module	Field Test Site/Group				
	Eastern Washington		University of Washington		Clark College
	Group 1	Group 2	Group 1	Group 2	
I	1	2	2	2	2
II	*	*	5	6	*
III	1	1	1	1	2
IV	2	1	1	1	1
V	2	1	1	1	1
VI	1	2	3	3	1
VII	1	*	2	2	1
VIII	1	6	*	4	*
IXa	4	4	4	5	4
IXb	*	*	-	-	*
X	1	1	5	3	1

* Insufficient data.

In converting the data of Table 14 to patterns of agreement, and to the representative pattern codes for Table 15, certain cells were not considered. Module IXb was ignored completely since there were no observer ratings, as was also true for Modules II and VIII at Clark College. Insufficient data for one or more elements of the pattern types made it impossible to determine a pattern type for four (4) more cells:

Module II, Eastern Washington, Group 1
Module II, Eastern Washington, Group 2
Module VII, Eastern Washington, Group 2
Module VIII, University of Washington, Group 1.

Of the remaining 49 cells in Table 14, the sets of percentages of agreement converted to the pattern types as coded in Table 15. In summary, the frequency of each of the types of patterns of agreement that appeared was:

Pattern 1	25	HH HH			
Pattern 2	11	LH HH	HH LH	HL HH	HH HL
Pattern 3	3	LH LH	LH HL	HL LH	
Pattern 4	5	LL HH	HH LL		
Pattern 5	3	LH LL	LL LH	HL LL	LL HL
Pattern 6	2	LL LL			

Several analytical concerns arise from an examination of Tables 14 and 15. Insufficient data, or no data at all, and low rater agreement are evident in six of the modules:

Module II	- insufficient data	- Eastern Washington, both groups - Clark College
	- low rater agreement	- University of Washington, both groups
Module VII	- insufficient data	- Eastern Washington, Group 2
Module VIII	- insufficient data	- University of Washington, Group 1 - Clark College
	- low rater agreement	- Eastern Washington, Group 2 - University of Washington, Group 2
Module IXa	- low rater agreement	- all sites, all groups
Module IXb	- insufficient data	- Eastern Washington, both groups - Clark College
	- no data	- University of Washington, both groups
Module X	- low rater agreement	University of Washington, Group 1

The concerns over insufficient data do not seem to be critical except for the apparent breakdown in procedure for obtaining observer ratings on Modules II and VIII at Clark College and the University of Washington's failure to submit any ratings for either the instructors or the students, for Module IXb. In every instance of insufficient data, it should be noted that there was high agreement between pairs of raters (either I-S or O-O) on at least one of the trial restorations. With respect to Module IXb, for which observer ratings were not expected to be made, the important fact is that there was high agreement between instructor and student on the ratings given in both trials.

Low rater agreement, however, is a concern which lies at the heart of the evaluation of the program of instruction. Low rater agreement implies that the criteria for rating restorations may have been unclear, the raters misinterpreted or misapplied the criteria, conditions under which the ratings were made were so different that true ratings would actually be different, or that some other sources of error were present in the rating process.

Reference has been made (p. 8) to the mathematical character of the rating scale. Although the scale is ordinal, strictly speaking, it seems appropriate at this point to consider further the unequal-interval characteristics associated with the C, I, and X ratings.

The relatively narrow difference between the ratings of C (correct) and I (improvable) is not reflected in either the percentages of agreement, which were derived solely from the number of pairs of ratings that matched perfectly, or the conversion to patterns of agreement. Yet, as mentioned earlier, a practical view of the ratings suggests that both the C and I ratings are indicative of a satisfactory restoration--the difference being only a matter of degree (which is reconcilable) by further work on the I-rated restoration. With this point of view, a secondary review was made of the raw data--the ratings by each individual--related to those cells in Table 15 for which pattern of agreement was not the ideal pattern type, pattern 1.

Assuming that a C,I pair of ratings represents a reconcilable difference and that, as a practical matter, both raters consider the restoration to be satisfactory, all C,I or I,C pairs of ratings are indicative of very near agreement. Under this assumption, Table 16 displays the second-level patterns of agreement resulting from inclusion of the C,I and I,C pairs of ratings in the calculation of percentage of agreement between raters.

Table 16

Initial and Second-Level* Pattern of Agreement
for Selected Modules and Groups

Module	Field Test Site/Group				
	Eastern Washington		University of Washington		Clark College
	Group 1	Group 2	Group 1	Group 2	
I	-	2/2	2/1	2/1	2/1
II	-	-	5/1	6/1	-
III	-	-	-	-	2/1
IV	2/1	-	-	-	-
V	2/1	-	-	-	-
VI	-	2/1	3/2	3/1	-
VII	-	-	2/2	2/1	-
VIII	-	6/1	-	4/1	-
IXa	4/2	4/2	4/2	5/1	4/1
IXb	-	-	-	-	-
X	-	-	5/1	3/1	-
XI	-	-	-	2/1	-

* C,I pairs of ratings elevated to Agree status.

Table 16 is a powerful display of the preceptual nearness of the C and I ratings. Inclusion of the C,I pairs of ratings as "practical" agreement, for the second-level conversion, caused 18 of the 24 patterns of less-than-ideal agreement to convert to the ideal, type 1 pattern. Second-level conversion resulted in a type 2 pattern of agreement in four cases: Three from initial type 4 patterns and one from the type 3 pattern. In two cases, the initial type 2 pattern of agreement was unchanged.

For these six cases in which a type 1 pattern of agreement failed to evolve, an even more intensive analysis was conducted. The incidence of these cases, extracted from Table 16, is reiterated here.

Module	Eastern Washington	University of Washington
I	Group 2	
VI		Group 1
VII		Group 1
IXa	Group 1 Group 2	Group 1

This concentrated display of the six problem cases makes it clear that the rating criteria were not uniformly interpreted, or applied, in three specific areas:

1. University of Washington, Group 1
2. Eastern Washington, Group 2
3. Module IXa.

Several interesting features in the second-level analysis of these six cases are apparent in a display of the rater pairs involved in the low agreement (L) elements of the initial and second-level pattern of agreement.

Module	Site / Group	Initial Pattern	Rater Pair	Second Pattern
I	Eastern Washington	HH LH	 0-0	HH LH
VI	University of Washington, Group 1	LH HL	I-S 0-0	LH HH
VII	University of Washington, Group 1	LH HH	I-S	LH HH
IXa	Eastern Washington, Group 1	HH LL	 0-0	HH HL
	Eastern Washington, Group 2	HH LL	 0-0	HH HL
	University of Washington, Group 1	HH LL	 0-0	HH LH

First, the three cases involving Group 1 at the University of Washington developed second-level agreement patterns of type 2:

Module VI	Module VII	Module IXa
LH	LH	HH
HH	HH	LH

This seems indicative of increasingly closer interpretation and application of the rating criteria by instructors and students. It should also be noted that this was the only group of dentistry students in the field test. The change in observer agreement from trial 1 (L) to trial 2 (H) may be due to a change in observers, due to chance, or to a better understanding of the criteria.

Secondly, the type 2 patterns of agreement that evolved for both groups at Eastern Washington on Module IXa are the only "reversals"--the observer's level of agreement changes from H on trial 1 to L on trial 2:

Group 1	Group 2
HH	HH
HL	HL

This phenomenon is inexplicable except for chance factors or a change in observers between trials.

Lastly, an inescapable observation is that the level of agreement between observers is a factor in five of the six cases. Not only that, but this is true with respect to both trials in three cases--all on Module IXa.

Test Restorations and Written Tests

Modules I-II

Table 17 presents a summary of student performance on the Class 1 Facial Pit Restoration. Agreement in assigning grades between students and instructors on the three restoration characteristics was 98% for carving, 69% for finishing, and 81% for polishing. It can be seen from the instructor and student ratings that students had no difficulty with the carving and were generally successful in finishing and polishing. Approximately one-quarter to one-third of the restorations needed improvement on finishing and polishing, but very few failed outright. Interestingly, the data on finishing shows students to be somewhat stricter than the instructors in their grading standards.

Agreements on ratings for the entire examination between instructor and observer, and students and observer, were all less than 67%; this was due to a disproportionate number of I's given by the observer. Apparently the observer's understanding of the driteria was not the same as that of the students and instructors. Table 17 shows these reliability percentages broken down by group. Even when examined this carefully, most of the percentages are less than 67%. Tabled in Appendix H are the frequencies of the various grades by instructors, students, and observers for this examination, along with the percentages of various levels of agreement for all possible pairs of raters.

On the written test, the mean class performance was 12.2 of a possible 19 points. An item analysis revealed that students rarely were completely unable to answer a question; rather, they received partial credit for the item. For example, in item 2--"What are the purposes of condensing amalgam?"--the question requires that the students list four purposes of condensing amalgam for a total of four possible points. Seven students received one point, 16 received two points, 26 received three points, and eight received four points. None of the students missed the question completely. Thus, it would appear that the students had acquired a reasonable level of background information which relates to the Class I Facial Pit Restoration.

Modules III-VI

Table 18 presents a summary of student performance on the Class V Cavity Restoration. Agreement in assigning grades between students and instructors

Table 17

Summary of Ratings and Percentage of Agreement All Groups, Examination on Modules I and II

Examination Section/ Ratings *	Rater		
	Instructor (I)	Student (S)	Observer (O)
Carving			
C	55	56	31
I	1	-	26
X	-	-	1
Finishing			
C	42	32	30
I	14	19	27
X	1	4	1
Polishing			
C	37	39	33
I	18	13	25
X	-	1	-

* C = Correct; I = Improvable to C; X = Incorrect.

Percentage of Agreement

Examination Section	Pairs of Raters		
	I,S	I,O	S,O
Carving	98	57	55
Finishing	69	54	58
Polishing	81	49	49

was only 59% for finishing but 79% for occlusion. The low percentage of reliability for finishing may indicate that students encountered difficulty because they had not adequately internalized the criteria as to what constitutes a good finish.

As can be seen from Table 18, the students were more lenient than the instructors in evaluating the finish on their restorations. The students were highly successful on occlusion.

Table 18 shows that agreements on ratings for finishing between instructors and observer, and students and observer, were all less than 67% (in fact, the highest reliability percentage was 59%). Since the reliabilities between instructors and students were also low for this category, apparently the criteria are unclear.

Appendix I contains tables of the frequencies of the various grades by instructors, students, and observer for this examination, along with the percentages of various levels of agreement for all possible pairs of raters.

On the written test, the mean grade received by students was 10.6 out of a possible 16 points. Again, partial credit was given. For example, there were five possible points for the question, "How do filled and unfilled resin differ?" Nobody was able to recall the five differences covered in the course, and only four students recalled four of the reasons. On the other hand, all students were able to recall at least one difference, with a median number of 45 recalling three of the differences.

Table 18

Summary of Ratings and Percentage of Agreement
All Groups, Examination on Modules III - VI

Examination Section/ Ratings	Rater		
	Instructor (1)	Student (S)	Observer (O)
Finishing			
C	12	20	19
I	31	25	23
X	11	9	9
Occlusion			
C	40	44	*
I	7	2	*
X	-	-	*

Percentage of Agreement

Examination Section	Pairs of Raters		
	I,S	I,O	S,O
Finishing	59	45	45
Occlusion	77	*	*

* No observer ratings made on Occlusion.

Final Examination

Table 19 presents a summary of student performance on the three final examination restorations. Agreement between students and instructors in their ratings range from "high" to "low": for the five categories in Table 19, the percentages of agreement are 59, 74, 54, 53, and 63. Students were more successful on the finishing and polishing of the Class I restoration than on the carving.

Results obtained in the carving of the Class II restoration followed a pattern similar to that for carving of the Class I restoration. Again, students improved on finishing and polishing. For the Class III restoration, student performance followed an unusual pattern which might be described as a "U" shaped curve. Students were either successful or unsuccessful in finishing the Class III restoration with relatively few ratings of "improvable" being assigned.

Table 19 shows that agreements on ratings between instructors and observer and students and observer were generally low. Again, there seems to be some problem in their use of the criteria. However, when the percentages for all possible pairs of raters broken down by group are used, the reliabilities for some categories and some groups are very high. For instance, instructor-student agreement on Class I finishing and polishing for Eastern Washington, Group 1, was 100%. Instructor-observer agreement for the same category for Eastern Washington, Group 2, was also 100%. The instructor-student and student-observer agreements were both 88%. For this same group, the instructor-student and student-observer agreement on Class I carving was

Table 19

Summary of Ratings and Percentage of Agreement
All Groups, Final Examination

Examination Section/Rating	Rater		
	Instructor (I)	Student (S)	Observer (O)
Class I Carving			
C	19	23	17
I	25	21	31
X	8	10	6
Class I, Finishing & Polishing			
C	26	27	3
I	15	19	46
X	4	1	4
Class II, Carving			
C	24	19	5
I	18	20	35
X	10	13	10
Class II, Finishing & Polishing			
C	21	21	3
I	7	10	34
X	8	7	13
Class III, Finishing			
C	23	26	8
I	11	12	21
X	20	16	25

Percentage of Agreement

Examination Section	Pairs of Raters		
	I,S	I,O	S,O
Class I			
Carving	59	46	48
Finishing & Polishing	74	42	43
Class II			
Carving	54	31	27
Finishing & Polishing	53	33	39
Class III			
Finishing	63	39	41

100%, and instructor-observer agreement was 90%. The other reliability percentages for this group are generally low, however.

Appendix J tables present the frequencies of the various grades by instructors, students, and observer for this examination, along with the percentages of various levels of agreement for all possible pairs of raters.

Instructor-Student Agreement on Examination Ratings

All of the percentages of agreement between pairs of raters on the three examinations, as shown in Table 20, were extracted from Appendices I and J.

It seems logical that instructor and students should be closely attuned to the interpretation and application of rating criteria by the time examinations are given. Such a strong expectation for the observer with either the instructor or students does not exist; therefore, this discussion is limited to the I,S percentages of agreement.

Of the 50 possible sets of I-S ratings on the examinations, it is notable that only 23 are "High" in percentage of agreement (67% or higher). In the remaining 27, one set was missing (no data from Eastern Washington), two had insufficient data (fewer than six pairs of ratings), and 24 were "Low" in percentage of agreement.

The rationale for a second-level analysis of the ratings on examinations may not be as persuasive as for the ratings on the separate modules.

Table 20

Percentage of Rater Agreement on Examination
(1) Modules I and II, (2) Modules III-VI

Group/ Rater Pair	Examination and Section				
	Modules I and II			Modules III-VI	
	Carving	Finishing	Polishing	Finishing	Occlusion*
Eastern Washington--Group 1					
I, S	100	100	90	30	100
I, O	63	50	70	56	-
S, O	56	50	70	33	-
Eastern Washington--Group 2					
I, S	89	44	60	50	50
I, O	70	30	10	20	-
S, O	67	56	20	50	-
University of Washington--Group 1					
I, S	100	56	88	50	100
I, O	40	44	63	50	-
S, O	40	67	50	50	-
University of Washington--Group 2					
I, S	100	80	60	75	100
I, O	80	70	70	57	-
S, O	80	50	70	43	-
Clark College					
I, S	100	65	100	81	100
I, O	44	67	41	44	-
S, O	44	65	31	44	-

* No observer ratings on Occlusion.

Table 20 (Continued)

Percentage of Rater Agreement on Examinations
Final Examination

Group/ Rater Pair	Examination and Section				
	Final Examination				
	Class I		Class II		Class III
	Carving	Finishing & Polishing	Carving	Finishing & Polishing	Finishing
Eastern Washington--Group 1					
I, S	50	100	50	56	60
I, O	30	0	22	33	40
S, O	40	0	11	33	40
Eastern Washington--Group 2					
I, S	100	88	38	-*	30
I, O	90	100	33	-*	80
S, O	60	88	33	-	30
University of Washington--Group 1					
I, S	50	44	60	60	60
I, O	50	70	50	50	40
S, O	50	56	50	30	60
University of Washington--Group 2					
I, S	50	**	60	**	80
I, O	40	33	20	50	40
S, O	60	56	30	60	50
Clark College					
I, S	71	82	58	50	78
I, O	29	9	29	9	7
S, O	36	27	14	40	29

* No ratings available.
** Insufficient data, fewer than six pairs of ratings available.

There are two factors, however, which justify a second analysis of the C and I ratings by the instructor and students on the examinations:

(1) the perceptual nearness of the C and I ratings, as was demonstrated earlier, and

(2) I ratings by the instructor would undoubtedly result in a passing grade for the student.

On this basis a second level analysis was made for the instructor-student ratings, for each group on each examination section for which the I-S percentage of agreement in Table 20 was less than 67%. For the 24 cases of "Low" initial I-S agreement on the examinations, Table 21 gives the second-level percentage of agreement determined by considering the numbers of both C,I and I,C pairs of ratings as "agreement" between the instructor and student.

Second-level agreement--actually this amounts to agreement as to whether a restoration is acceptable or unacceptable--between instructor and student on the rating of examination restorations was low in only three cases. All of these cases were on the final examination:

Class I, Carving ---- University of Washington, Group 1
Class II, Carving ---- Eastern Washington, Group 2
Class II, Finishing ---- Eastern Washington, Group 2

The paired ratings given by the instructor and student may provide some insight concerning their differences in interpretation of the criteria.

Table 21

Second-Level Percentage of Agreement
between Instructor and Student
on Selected Examination Sections

Examination and Section	Field Test Site and Group				
	Eastern Washington		University of Washington		Clark College
	Group 1	Group 2	Group 1	Group 2	
Modules I-II					
Carving	-	-	-	-	-
Finishing	-	78	89	-	100
Polishing	90	-	100	-	-
Modules III-VI					
Finishing	100	90	70	-	-
Occlusion	-	100	-	-	-
Final Class I					
Carving	80	-	60	80	-
Finishing & Polishing	-	-	67	-	-
Class II					
Carving	100	50	80	80	86
Finishing & Polishing	67	-	80	-	100
Class III					
Finishing	100	40	70	-	-

Class I, Carving ------ University of Washington, Group 1

I-S ordered pairs of ratings were::

2-CC
1-II
2-XX
1-IC
2-IX
2-XI

Class II, Carving ----- Eastern Washington, Group 2

I-S ordered pairs of ratings were:

1-CC
2-II
1-CI
2-CX
2-XI

Class III, Finishing -- Eastern Washington, Group 2

I-S ordered pairs of ratings were:

2-II
1-XX
1-IC
1-CX
1-IX
2-XI
2-XC

This exposition offers little support for any definitive diagnosis of the differences between instructor and students. It can only be stated, generally, that the diversity between instructor(s) and students at the University of Washington was less pronounced than at Eastern Washington.

Evaluation of Instructional Materials

Student Evaluations

Thirty student evaluation forms were returned from Eastern Washington and from Clark College. Students checked statements they agreed with for the following eleven categories:

1. procedure description
2. photographs
3. drawings and diagrams
4. summary of objectives, procedures, and criteria
5. evaluation form
6. models
7. videotapes
8. practicing procedure
9. instructional plan
10. ready for patients?
11. overall rating of the course.

Although frequency counts were compiled for each of the items in the eleven categories, space limitations preclude a detailed presentation of this data. Beginning with the last and most general category, "overall rating of the course," seven students rated it as "excellent," 13 as being "very good," eight felt it was "good," and only one student assigned it a rating of "poor."

Twenty-four of the 30 students felt the procedure description was helpful in understanding the procedure; only four students felt more detail was needed, and only three felt there was too much detail.

Twenty-four or 80% of the respondents felt the photographs helped them learn the procedure and 21 or 70% felt they had "good detail generally."

Twenty-two students felt the drawings and idagrams were adequately labelled, and only one student checked the item "inadequate labelling." Twenty-five of the students felt that the drawings and diagrams "generally got the message across."

Twenty-three students said that the evaluation forms were "helpful in understanding my progress," and only four students felt they were "not helpful."

Twenty-six respondents felt the models helped them with "visualization," and only two students felt they were not helpful.

The best score was received for the videotapes in which 29 of the 30 respondents checked that the tapes were "helpful in learning how to do it," and no students indicated that the tapes were "not helpful." All but five students viewed the videotapes more than once.

"Practicing the procedure" received the lowest score. Only 12 felt they received "adequate practice" and 18 felt they "needed more practice."

Most students liked the unique instructional plan as evidenced by the fact that 18 "liked not having lectures," and only four felt they "needed lectures." Also, 19 liked "being on my own."

For the category "ready for patients," 20 students felt they "could place (a) restoration with guidance from (an) instructor."

Instructor Evaluation

A revised form was used to assess reactions of the instructors to the course. The response pattern of the eleven instructors was similar to that of the students, and to conserve space they have been omitted from this section.

IMPLICATIONS

The 11 basic modules of the course of instruction in Restorative Dentistry developed under Project ACORDE were directed purposefully toward two major learning goals for students:

1. acquisition of the necessary skills and knowledge of appropriate tools and materials
2. self-appraisal of one's own work in performing the various restorations.

Emphasis upon this latter goal resulted in the development of stated criteria for acceptable standards on the several characteristics of each restoration. Also, physical models of the restorations were produced to provide tangible examples of these criteria.

This evaluation has been focused upon the sets of criteria--whether stated or modeled--to determine if the criteria were so rendered as to be uniformly interpreted and applied in rating the quality of student's restorations. Student, instructor, and outside observers rated the student restorations as C (correct), I (improvable to C), or X (unacceptable, not improvable). The degree of uniformity of interpretation and application of the criteria was analyzed in terms of agreement in ratings of each restoration by each pair of raters.

Results of these analyses, described in detail in the preceding section of this report, bear important implications for future use of the program. Commonality of background and experience are the important factors that contribute to higher interrater agreement. The low rater agreement is almost wholly associated with the observers.

The field test data clearly indicate that the rating criteria are so stated, and modeled, as to effect "high" agreement on the rating of student restorations between students, instructors, and observers. This is so in spite of the limiting factors: fewer than 50 students, no more than eight or nine instructors, the five field test groups in three different training situations (one group in training to become dentists, two groups in training to become dental hygienists, and one group of dental hygienists in a re-training program), and lack of continuity of observers throughout the field test. The compounding of these factors restricted the analysis design to just one level of sophistication above a simply descriptive evaluation. Even so, the results suggest a strong program of instruction, and sets of rating criteria--both stated and modeled--that result in restoration ratings of high reliability.

APPENDIX

A

Criteria for Evaluation of Restoration

Modules I through XI

Module I

EVALUATION FORM

Student's Name

Student's Number

C = criterion met; I = improvable; X = not improvable.

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Procedure completed: a. Examine cavity preparation for debris. b. Clean cavity with warm water spray. c. Dry cavity with gentle stream of warm air. d. Examine cavity preparation and note size, outline, location on tooth, and contour of tooth structure adjacent to cavity.										
2. Cavity preparation clean and dry.										
Errors:										
COPAL VARNISH										
Procedure completed: a. Coat the walls and cavosurface margins with copal varnish. b. Dry with a gentle stream of air. c. Apply a second coat of copal varnish. d. Dry with a gentle stream of air.										
Errors:										
CONDENSATION										
1. Procedure completed: a. Visualize the size and shape of the cavity preparation. b. Eject a small increment of amalgam, partially filling the cavity. c. Condense forcefully at least six times with small end of the condenser. d. Eject a second increment of amalgam to overfill the cavity. e. Condense second increment at least six times using the small then large end of the condenser. f. Eject and condense a third increment of amalgam if the second did not slightly overfill the cavity.										
2. Amalgam covers the cavity margins.										
3. Cavity is slightly overfilled.										
Errors:										
1. Cavity is overfilled.										
2. Cavity underfilled.										
3. Other:										

Module I
Page 2

____
Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CARVING	1	2	3	4	5	1	2	3	4	5
1. Tooth structure and amalgam are flush along margins.										
2. Contour of restoration approximates original contour of tooth.										
3. Surface of the restoration has a consistent texture.										
Errors:										
1. Submarginal area.										
2. Amalgam overextended in facial groove.										
3. Other amalgam overextensions.										
4. Facial groove too deep.										
5. Facial groove too shallow.										
6. Other: ____________________										
FINISHING										
1. Tooth structure and amalgam are flush at the margins.										
2. Contour of restoration approximates original contour of tooth.										
3. Surface of restoration has a consistent texture.										
Errors:										
1. Facial groove too deep.										
2. Facial groove too shallow.										
3. Overextensions.										
4. Other: ____________________										
POLISHING										
Amalgam is smooth and shiny.										
Errors:										
1. Amalgam shows scratches.										
2. Amalgam has pits.										
3. Other: ____________________										

Module II

EVALUATION FORM

______________________________ Student's Name

C = criterion met; I = improvable; X = not improvable.

______________________________ Student's Number

Note any error and whether it's improvable or not improbable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
GINGIVAL RETRACTOR AND CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Gingiva retracted 0.5mm to 1mm below gingival margin of preparation.	___	___	___	___	___	___	___	___	___	___
2. Retractor does not impinge on either rubber dam or gingiva.	___	___	___	___	___	___	___	___	___	___
3. No compound blocking access to facial surface of tooth.	___	___	___	___	___	___	___	___	___	___
4. Notches of retractor free of compound.	___	___	___	___	___	___	___	___	___	___
5. Retractor is stable.	___	___	___	___	___	___	___	___	___	___
6. Procedural steps completed:	___	___	___	___	___	___	___	___	___	___
a. Examine cavity preparation for debris, using a mirror and explorer.										
b. Clean cavity with a warm water spray.										
c. Dry cavity with a gentle stream of warm air.										
d. Examine cavity preparation and note size, outline, location on tooth, location and depth of retention grooves, and contour of tooth structure adjacent to cavity.										
7. Cavity preparation clean and dry.	___	___	___	___	___	___	___	___	___	___
Errors:										
______________________________	___	___	___	___	___	___	___	___	___	___
COPAL VARNISH										
Procedure completed:	___	___	___	___	___	___	___	___	___	___
a. Coat the walls and cavosurface margins with copal varnish.										
b. Dry the varnish with a gentle stream of air.										
c. Apply a second coat of copal varnish.										
d. Dry with a gentle stream of air.										
Errors:										
______________________________	___	___	___	___	___	___	___	___	___	___
CONDENSATION										
1. Procedure completed:	___	___	___	___	___	___	___	___	___	___
a. Visualize the size and shape of the cavity preparation; observe size of cavity to determine appropriate amount of alloy and mercury.										
b. Eject a small increment of amalgam against the axial wall and spread it in all directions in the preparation.										
c. Condense first increment into gingival and occlusal retention grooves.										
d. Add a second increment of amalgam to fill the cavity and condense against the walls and margins.										
e. Add a third increment of amalgam to overfill the cavity and condense against the margins.										
2. Amalgam covers the margins.	___	___	___	___	___	___	___	___	___	___
3. Cavity is slightly overfilled.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Cavity overfilled.	___	___	___	___	___	___	___	___	___	___
2. Cavity underfilled.	___	___	___	___	___	___	___	___	___	___
3. Other: ______________________________	___	___	___	___	___	___	___	___	___	___

Module II
Page 2

____
Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CARVING	1	2	3	4	5	1	2	3	4	5
1. Tooth structucre and amalgam are flush along the margins.	___	___	___	___	___	___	___	___	___	___
2. Contour of restoration approximates original contour of tooth.	___	___	___	___	___	___	___	___	___	___
3. Surface of the restoration has a consistent texture.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Submarginal area on gingival margin.	___	___	___	___	___	___	___	___	___	___
2. Open margin or void along margin.	___	___	___	___	___	___	___	___	___	___
3. Overcarved.	___	___	___	___	___	___	___	___	___	___
4. Undercarved.	___	___	___	___	___	___	___	___	___	___
5. Other: ____________________	___	___	___	___	___	___	___	___	___	___
FINISHING										
1. Tooth structure and amalgam are flush at the margins.	___	___	___	___	___	___	___	___	___	___
2. Contour of restoration approximates original contour of tooth.	___	___	___	___	___	___	___	___	___	___
3. Surface of the restoration has a consistent texture.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Cementum damaged.	___	___	___	___	___	___	___	___	___	___
2. Other: ____________________	___	___	___	___	___	___	___	___	___	___
POLISHING										
Amalgam is smooth and shiny.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Amalgam has scratches or pits.	___	___	___	___	___	___	___	___	___	___
2. Cementum damaged.	___	___	___	___	___	___	___	___	___	___
3. Other: ____________________	___	___	___	___	___	___	___	___	___	___

Module III

EVALUATION FORM

______________________ Student's Name

______________________ Student's Number

C = criterion met; I = improvable; X = not improvable.

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
GINGIVAL RETRACTOR AND CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Gingiva retracted 0.5mm to 1mm below gingival margin of preparation.	___	___	___	___	___	___	___	___	___	___
2. Retractor does not impinge on either rubber dam or gingiva.	___	___	___	___	___	___	___	___	___	___
3. No compound blocking access to facial surface of tooth.	___	___	___	___	___	___	___	___	___	___
4. Notches of retractor free of compound.	___	___	___	___	___	___	___	___	___	___
5. Retractor is stable.	___	___	___	___	___	___	___	___	___	___
6. Procedural steps completed:	___	___	___	___	___	___	___	___	___	___
a. Examine cavity preparation for debris.										
b. Clean cavity with a warm water spray.										
c. Dry cavity with a gentle flow of warm air.										
d. Examine cavity preparation and note size, outline, and location on tooth, location and depth of retention grooves, and contour of tooth structure adjacent to cavity.										
7. Cavity clean and dry.	___	___	___	___	___	___	___	___	___	___
Errors: ______________________	___	___	___	___	___	___	___	___	___	___
CALCIUM HYDROXIDE LINER										
1. Dentin walls have continuous thin film of calcium hydroxide liner.	___	___	___	___	___	___	___	___	___	___
2. Cavosurface margins and enamel walls free of liner. (On plastic tooth liner is 1 to .5 mm from the cavosurface margins.)	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Calcium hydroxide liner extends over margins.	___	___	___	___	___	___	___	___	___	___
2. Liner extends onto enamel walls.	___	___	___	___	___	___	___	___	___	___
3. Other: ______________________	___	___	___	___	___	___	___	___	___	___
PLACEMENT OF UNFILLED RESIN										
1. All cavosurface margins covered with resin.	___	___	___	___	___	___	___	___	___	___
2. Preparation slightly overfilled.	___	___	___	___	___	___	___	___	___	___
3. Entire surface of restoration covered with protective coating.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Shrinkage of resin at margins.	___	___	___	___	___	___	___	___	___	___
2. Surface of restoration chalky.	___	___	___	___	___	___	___	___	___	___
3. Preparation underfilled and undercontoured.	___	___	___	___	___	___	___	___	___	___
4. Preparation overfilled and overcontoured.	___	___	___	___	___	___	___	___	___	___
5. Other: ______________________	___	___	___	___	___	___	___	___	___	___

Module III
Page 2

________________ ________________
Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5
FINISHING										
1. Tooth structure and resin are flush at cavosurface margins.										
2. Resin restoration reproduces original contour of tooth.										
Errors:										
1. Submarginal areas cut in restoration by gold knife.										
2. Cuts in cementum from improper use of white stone.										
3. Cuts in cementum from improper disking.										
4. Other: ____________________										
POLISHING										
Surface of restoration is smooth and glossy.										
Errors:										
1. Scratches on surface of restoration.										
2. Surface rough and pitted.										
3. Voids visible.										
4. Surface porous and sandy.										
5. White line along margins from calcium hydroxide liner.										
6. Other: ____________________										

Module IV

EVALUATION FORM

____
Student's Name

C = criterion met; I = improvable; X = not improvable.

____
Student's Number

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Procedural steps completed:	___	___	___	___	___	___	___	___	___	___
a. Examine cavity preparation for debris.										
b. Clean cavity with warm water spray.										
c. Dry cavity with gentle stream of air.										
d. Examine cavity preparation and note size, outline, and location on tooth, location and depth of retention grooves, and contour of tooth structure adjacent to cavity.										
2. Cavity clean and dry.	___	___	___	___	___	___	___	___	___	___
CALCIUM HYDROXIDE LINER										
1. Dentin walls have a continuous thin film of calcium hydroxide liner.	___	___	___	___	___	___	___	___	___	___
2. Cavosurface margins and enamel walls free of liner. (On plastic tooth liner is 1 to .5 mm from the cavosurface margins.)	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Calcium hydroxide liner extends over margins.	___	___	___	___	___	___	___	___	___	___
2. Liner extends onto enamel walls.	___	___	___	___	___	___	___	___	___	___
3. Other: ______________	___	___	___	___	___	___	___	___	___	___
WEDGE AND MATRIX STRIP										
1. Wedge is below gingival margin.	___	___	___	___	___	___	___	___	___	___
2. Wedge fits gingival embrasure.	___	___	___	___	___	___	___	___	___	___
3. Wedge does not encroach on cavity preparation.	___	___	___	___	___	___	___	___	___	___
4. Wedge is stable.	___	___	___	___	___	___	___	___	___	___
5. Rubber dam undamaged.	___	___	___	___	___	___	___	___	___	___
6. Matrix strip extends 1mm beyond gingival and incisal margins.	___	___	___	___	___	___	___	___	___	___
7. Matrix adapts smoothly to tooth to contour restoration.	___	___	___	___	___	___	___	___	___	___
8. Access to preparation not impaired.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Matrix distorted from contact.	___	___	___	___	___	___	___	___	___	___
2. Wedge impinges on gingiva.	___	___	___	___	___	___	___	___	___	___
3. Other: ______________	___	___	___	___	___	___	___	___	___	___

Module IV
Page 2

____
Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
PLACEMENT OF SILICATE CEMENT	1	2	3	4	5	1	2	3	4	5
1. Cavity is filled or just slightly overfilled at the margins.										
2. Restoration is free of voids.										
3. Original contour of tooth reproduced or cavity just slightly overfilled.										
4. Tooth structure beyond margins is free of flash.										
5. Restoration covered with protective film within one minute of placement.										
Errors:										
1. Excessive flash.										
2. Restoration overcontoured.										
3. Restoration undercontoured.										
4. Restoration not translucent.										
5. Other: ______________________________										
FINISHING										
1. Tooth structure and silicate cement are flush at the margins.										
2. Restoration reproduces the original contour of the tooth.										
Errors:										
1. Restoration undercontoured.										
2. Restoration rough and scratched.										
3. Other: ______________________________										

Module V

EVALUATION FORM

____
Student's Name

C = criterion met; I = improvable; X = not improvable.

____
Student's Number

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Cavity preparation is clean and dry.	___	___	___	___	___	___	___	___	___	___
2. Preparation examined and features noted.	___	___	___	___	___	___	___	___	___	___
CALCIUM HYDROXIDE LINER										
1. Dentin walls have continuous thin film of calcium hydroxide liner.	___	___	___	___	___	___	___	___	___	___
2. Enamel walls and cavosurface margins free of liner. (On plastic tooth liner is 1 to .5mm from cavosurface margins.)	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Calcium hydroxide liner extends over margins.	___	___	___	___	___	___	___	___	___	___
2. Liner extends onto enamel walls.	___	___	___	___	___	___	___	___	___	___
3. Other: ______________________	___	___	___	___	___	___	___	___	___	___
WEDGE AND MATRIX STRIP										
1. Wedge is below gingival margin.	___	___	___	___	___	___	___	___	___	___
2. Wedge fits gingival embrasure.	___	___	___	___	___	___	___	___	___	___
3. Wedge does not encroach on cavity preparation.	___	___	___	___	___	___	___	___	___	___
4. Wedge is stable.	___	___	___	___	___	___	___	___	___	___
5. Rubber dam undamaged.	___	___	___	___	___	___	___	___	___	___
6. Matrix strip extends 1mm beyond gingival and incisal margins of cavity preparation.	___	___	___	___	___	___	___	___	___	___
7. Matrix will adapt smoothly to the tooth to contour restoration.	___	___	___	___	___	___	___	___	___	___
Errors:										
______________________	___	___	___	___	___	___	___	___	___	___
PLACEMENT OF FILLED RESIN										
1. Cavity slightly overfilled at margins.	___	___	___	___	___	___	___	___	___	___
2. Restoration free of voids.	___	___	___	___	___	___	___	___	___	___
3. Original contour of tooth reproduced in proximal area.	___	___	___	___	___	___	___	___	___	___
4. Restoration covered with protective film.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Cavity preparation underfilled.	___	___	___	___	___	___	___	___	___	___
2. Gross overfill at margins.	___	___	___	___	___	___	___	___	___	___
3. Other: ______________________	___	___	___	___	___	___	___	___	___	___

Student's Name and Number: ______________________

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
FINISHING	1	2	3	4	5	1	2	3	4	5
1. Tooth structure and restoration are flush at cavosurface margins.										
2. Restoration is smooth.										
3. Restoration reproduces original contour of the tooth.										
4. Occlusion markings on the restoration are the same density as those on adjacent tooth structure and teeth.										
Errors:										
1. Submarginal area cut in restoration by gold knife.										
2. Groove cut in restoration by improper disking.										
3. Other: ______________________										

Module VI

EVALUATION FORM

____
Student's Name

C = criterion met; I = improvable; X = not improvable.

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Student's Number

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5
CAVITY PREPARATION										
1. Cavity preparation is clean and dry.										
2. Preparation examined and features noted.										
CALCIUM HYDROXIDE LINER										
1. Dentin walls have continuous thin film of calcium hydroxide liner.										
2. Enamel walls and cavosurface margins free of liner.										
Errors:										
1. Calcium hydroxide liner extends over margins.										
2. Liner extends onto enamel walls (is closer than 0.5mm to margins on plastic tooth).										
3. Other:________________________										
DEAD SOFT METAL MATRIX AND WEDGE										
1. Facial end of matrix strip is flush with facial surface of tooth.										
2. Matrix strip extends 1 to 2mm beyond the gingival margin of cavity preparation.										
3. Matrix strip extends 2 to 3mm beyond the incisal edge of the tooth.										
4. Wedge is below the gingival margin.										
5. Rubber dam undamaged.										
6. Wedge does not impinge on soft tissue.										
7. Proximal contour of matrix is a smooth line from gingival margin of the cavity preparation to the incisal edge.										
8. Proximal contour of matrix is convex as viewed from the incisal edge.										
9. Contact is established with the adjacent incisor in the incisal one third of the crown.										
10. Compound is over the lingual aspect of the strip, tooth, and wedge, stabilizing strip and wedge.										
11. Cavity margins are free of compound.										
Errors:										
1. Wedge is above the gingival margin.										
2. Metal matrix is crinkled.										
3. Other:________________________ ________________________										

Module VI
Page 2

____
Student's Name and Number

	Instructor Evaluation Trials					Self Evaluation Trials				
	1	2	3	4	5	1	2	3	4	5
PLACEMENT OF FILLED RESIN										
1. Resin feels hard when touched with the explorer.										
2. Slight overfill on facial and incisal surfaces and on margins.										
3. Minimal excess on lingual and gingival margins.										
4. Proximal contour is a smooth line from the gingival margin of the cavity to the incisal edge.										
5. Proximal contour is convex as viewed from the incisal edge.										
6. Contact exists between the restoration and the adjacent incisor in the incisal one third of the crown.										
7. Resin surface is free of defects.										
Errors:										
1. Resin won't set up.										
2. Undercontour on proximal surface.										
3. Voids, pits in surface.										
4. No overfill on margins.										
5. Other: ____________										
FINISHING										
1. Margins and tooth structure are flush at the cavosurface margins.										
2. Restoration is smooth, without visible scratches.										
3. Restoration reproduces the original contour of the tooth.										
4. Contact exists between the restoration and adjacent tooth in the incisal one third of the crown.										
Errors:										
1. ____________										
2. ____________										
OCCLUSION										
Restoration is out of occlusion.										
Errors: ____________										

Module VII

EVALUATION FORM

Student's Name ______________________

Student's Number ______________________

C = criterion met; I = improvable; X = not improvable.

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5
CAVITY PREPARATION										
1. Cavity preparation clean and dry.										
2. Preparation examined and features noted.										
COPAL VARNISH										
Procedure completed.										
a. Coat the walls and cavosurface margins with with copal varnish.										
b. Dry the varnish with a gentle stream of air.										
c. Apply a second coat of copal varnish.										
d. Dry with a gentle stream of air.										
Errors: ______________________										
CUSTOM MATRIX AND WEDGE										
1. Wedge has complete contact with tooth surface apical to gingival margin and with adjacent tooth.										
2. Wedge does not encroach on cavity preparation.										
3. Wedge is stable.										
4. Corners of matrix band are blunted (rounded).										
5. Matrix band stabilized by compound on facial and lingual surfaces.										
6. Matrix band extends 0.5mm to 1mm beyond gingival margin and to height of cusp tip.										
7. Lingual edge of matrix band parallel with plane of lingual surface.										
8. Matrix band contoured at contact area.										
9. Contoured contact area of band aligned with contact area of adjacent tooth.										
10. No impingement on rubber dam by either wedge or matrix.										
11. Cavity preparation free of compound.										
Errors:										
1. Matrix inadequately contoured.										
2. Access to preparation impaired by matrix or compound.										
3. Other: ______________________										
CONDENSATION										
1. Procedure completed:										
a. Visualize the size and shape of the cavity preparation.										
b. Eject a small increment of amalgam and spread it in the cavity preparation.										
c. Condense first increment along axial line angles and into retention grooves.										
d. Eject and condense a third small increment, covering the margins and slightly overfilling the cavity.										
2. Amalgam covers the cavity margins.										
3. Cavity is slightly overfilled.										
Errors:										
1. Cavity overfilled.										
2. Cavity underfilled.										
3. Other: ______________________										

____
Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5
CARVING										
1. Tooth structure and amalgam are flush along margins.										
2. Both proximal and lingual contour of restoration approximate original anatomical contour of tooth.										
3. Original contact reproduced.										
4. Surface of restoration is a consistent texture.										
5. Restoration free of heavy blue marks.										
Errors:										
1. Submarginal area.										
2. Lingual fossa undercarved.										
3. Marginal ridge overcarved.										
4. Overextensions.										
5. Other: ______________________										
FINISHING										
1. Restoration free of heavy blue marks.										
2. Tooth structure and amalgam are flush at the margirs.										
3. Contour of restoration approximates original anatomical contour of tooth.										
4. Surface of restoration is a consistent texture.										
Errors:										
1. Submarginal area.										
2. Voids exposed.										
3. Marginal ridge overfinished.										
4. Contact faulty or absent.										
5. Other: ______________________										
POLISHING										
Amalgam is smooth and shiny.										
Errors: ______________________										

Module VIII

EVALUATION FORM

Student's Name

Student's Number

C = criterion met; I = improvable; X = not improvable.

Note any error and whether it's improvable or not improvable.

Instructor Evaluation — Trials: 1 2 3 4 5

Self Evaluation — Trials: 1 2 3 4 5

CAVITY PREPARATION

1. Cavity preparation is clean and dry.
2. Preparation examined and features noted.

Errors:

COPAL VARNISH

Procedure completed:
- a. Coat the walls and cavosurface margins with copal varnish.
- b. Dry the varnish with a gentle stream of air.
- c. Apply a second coat of copal varnish.
- d. Dry with a gentle stream of air.

Errors:

CONDENSATION

1. Procedure completed:
   - a. Visualize the size and shape of the cavity preparation.
   - b. Eject two small initial increments of amalgam to partially fill the cavity.
   - c. Condense the amalgam forcefully.
   - d. Eject and condense a second increment of amalgam.
   - e. Eject and condense a third increment of amalgam.
   - f. Eject and condense a fourth increment of amalgam.
2. Amalgam covers the cavity margins.
3. Cavity is slightly overfilled by approximately [illegible]mm.

Errors:

CARVING

1. Tooth structure and amalgam are flush along margins.
2. Contour of the restoration approximates original contour of the tooth.
3. Surface of the restoration is a consistent texture.

Errors:
1. Mesial or distal pit improperly placed.
2. Non-improvable submarginal area.
3. Open margin.
4. Other:

INITIAL OCCLUSAL ADJUSTMENT

1. Centric markings on the restoration, the tooth, and the adjacent teeth are of the same density.
2. The restoration is free of excursive contacts.

Errors:

FINISHING AND POLISHING

1. Tooth structure and amalgam are flush at margins.
2. All flash is removed.
3. Contour of the restoration approximates the original contour of the tooth.
4. Restoration is smooth and shiny.
5. Centric markings on the restoration, the tooth, and the adjacent teeth are of the same density.
6. The restoration is free of excursive contacts.

Errors:
1. Detail of carving polished out.
2. Other:

Module IX - Temporary Restoration

EVALUATION FORM

______________________ Student's Name

C = criterion met; I = improvable; X = not improvable.

______________________ Student's Number

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation Trials					Self Evaluation Trials				
	1	2	3	4	5	1	2	3	4	5
CAVITY PREPARATION										
1. Cavity preparation is clean and dry.										
2. Preparation examined and features noted.										
Errors:										
______________________										
TOFFLEMIRE MATRIX BAND AND RETAINER										
1. Retainer is toward and tangential to the facial surfaces of the teeth.										
2. Retainer is parallel with the occlusal surfaces of the teeth.										
3. Band and retainer are securely in place.										
4. Band is 0.5mm to 1mm gingival to the gingival margin and secure against the proximal box.										
5. Band is 0.5mm to 1mm occlusal to the junction of occluso-facial and mesio-facial cavosurface margins.										
Errors:										
______________________										
______________________										
ZINC OXIDE-EUGENOL RESTORATION										
1. Procedure completed:										
a. Clean and dry the cavity preparation.										
b. Visualize size and shape of cavity preparation.										
c. Place ZOE in the proximal area.										
d. Pack ZOE.										
e. Place and pack ZOE into remainder of cavity preparation.										
f. Seal the occlusal cavosurface margins.										
g. Create occlusal embrasure and marginal ridge.										
2. Cavity preparation slightly overfilled.										
3. Cavosurface margins covered by approximately 0.5mm to 1mm.										
Errors:										
______________________										
______________________										
CARVING AND CONTOURING THE ZOE										
1. The ZOE cement and the tooth structure are flush at the cavosurface margins.										
2. The major features of the original contour of the tooth have been recreated.										
Errors:										
______________________										
ADJUSTING OCCLUSION										
The restoration is out of occlusion.										
Errors:										
______________________										

Module IX - Amalgam Restoration EVALUATION FORM

____
Student's Name

C = criterion met; I = improvable; X = not improvable.

____
Student's Number

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Cavity preparation is clean and dry.										
2. Preparation examined and features noted.										
Errors: ______________________										
COPAL VARNISH										
Procedure completed: a. Coat the walls and cavosurface margins of the cavity preparation with copal varnish. b. Dry the varnish with a gentle stream of air. c. Apply a second coat of copal varnish. d. Dry with a gentle stream of air.										
Errors: ______________________										
TOFFLEMIRE MATRIX BAND AND RETAINER AND WEDGE										
1. Retainer is toward and tangential to the facial surfaces of the teeth.										
2. Retainer is parallel with the occlusal surfaces of the teeth.										
3. Band is 0.5mm to 1mm gingival to gingival margin.										
4. Band 0.5mm to 1.5mm occlusal to the junction of the occluso-facial and mesio-facial cavosurface margins.										
5. Wedge rests snugly against gingival surface.										
6. Wedge extends no more than 4mm to 5mm beyond the facial and lingual surfaces when viewed from the occlusal.										
7. Wedge and matrix band held securely in place with compound.										
Errors: ______________________										
CONDENSATION										
1. Procedure completed: a. Visualize the size and shape of the cavity preparation. b. Eject amalgam to partially fill proximal box. c. Condense amalgam forcefully. d. Eject and condense a second increment into the proximal box. e. Eject and condense a third increment of amalgam into the occlusal box. f. Eject and condense a fourth increment of amalgam into the occlusal box. g. Eject and condense a fifth increment of amalgam into the occlusal box. h. Eject and condense a sixth increment of amalgam into the occlusal box.										
2. Amalgam covers the margins.										
3. Cavity is slightly overfilled.										
4. The condensed amalgam is 1mm higher than the marginal ridge of the adjacent tooth and no more than 0.5mm below the top of the matrix band.										
Errors: ______________________										
______________________										

Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5
CARVING										
1. The tooth and the amalgam are flush at the cavosurface margins.										
2. Contour of the restoration approximates the original contour of the tooth.										
3. Proximal contact is reestablished.										
4. Surface of the restoration is a consistent texture.										
Errors:										
1. Mesial or distal pit improperly placed.										
2. Non-improvable submarginal area.										
3. Open margin.										
4. Marginal ridge overcarved.										
5. Other:										
ADJUSTING OCCLUSION										
1. Centric markings on restoration, tooth, and adjacent teeth are of the same density.										
2. Restoration free of excursive contacts.										
Errors:										
FINISHING AND POLISHING										
1. Tooth structure and amalgam are flush at the margins.										
2. Contour of the restoration approximates the original contour of the tooth.										
3. Centric markings on the restoration, tooth, and adjacent teeth are of the same density.										
4. Restoration is free of excursive contacts.										
5. Proximal contact is present.										
6. The restoration is smooth and shiny.										
Errors:										
1. Detail of carving polished out.										
2. Other:										

Module X

EVALUATION FORM

Student's Name ______________________

Student's Number ______________________

C = criterion met; I = improvable; X = not improvable.

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5

CAVITY PREPARATION

1. Cavity Preparation clean and dry.
2. Preparation examined and features noted.

Errors:

____

COPAL VARNISH

Procedure completed.

Apply two coats of copal varnish to the walls and cavosurface margins of the cavity preparation.

Errors:

____

TOFFLEMIRE MATRIX BAND, RETAINER, ACCESSORY MATRIX, AND WEDGE

1. Accessory matrix extends 1mm to 2mm beyond the distal and mesial margins.
2. Accessory matrix extends beyond the gingival margin of the lingual box.
3. Accessory matrix and wedge do not extend occlusally beyond the primary matrix band.
4. Tofflemire matrix band and retainer, accessory matrix, wedge, and compound are stable.

Errors:

____

CONDENSATION

1. Procedure completed.
    - a. Visualize the size and shape of the cavity preparation.
    - b. Place and condense a small increment of amalgam in the lingual box.
    - c. Place and condense a second increment of amalgam in the lingual box.
    - d. Place and condense a third increment of amalgam in the occlusal box.
    - e. Place and condense a fourth increment of amalgam.
    - f. Place and condense a fifth increment of amalgam.
2. The cavity is slightly overfilled.
3. The margins are covered.

Errors:

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Module X
Page 2

____
Studen'ts Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
	1	2	3	4	5	1	2	3	4	5
CARVING										
1. Tooth structure and amalgam are flush along the cavosurface margins.										
2. Contour of the restoration approximates the original contour of the tooth.										
3. Surface of the restoration is a consistent texture.										
Errors:										
1. Restoration ditched.										
2. Non-improvable submarginal areas.										
3. Open margin.										
4. Other:____________________										
FINISHING AND POLISHING										
1. Tooth structure and amalgam are flush at the margins.										
2. Contour of the restoration approximates the original contour of the tooth.										
3. Restoration is smooth and shiny.										
Errors:____________________										

Module XI

EVALUATION FORM

____
Student's Name

C = criterion met; I = improvable; X = not improvable.

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Student's Number

Note any error and whether it's improvable or not improvable.

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
GINGIVAL RETRACTOR AND CAVITY PREPARATION	1	2	3	4	5	1	2	3	4	5
1. Gingival retracted 0.5mm to 1mm below gingival margin of the preparation.	___	___	___	___	___	___	___	___	___	___
2. Retractor does not impinge on either rubber dam or gingiva.	___	___	___	___	___	___	___	___	___	___
3. No compound blocks access to the facial surface of the tooth.	___	___	___	___	___	___	___	___	___	___
4. Notches of retractor are free of compound.	___	___	___	___	___	___	___	___	___	___
5. Retractor is stable.	___	___	___	___	___	___	___	___	___	___
6. Cavity preparation is clean and dry.	___	___	___	___	___	___	___	___	___	___
7. Preparation examined and features noted.	___	___	___	___	___	___	___	___	___	___
Errors:										
________________________	___	___	___	___	___	___	___	___	___	___
CALCIUM HYDROXIDE BASE										
Base covers only deep areas of preparation.	___	___	___	___	___	___	___	___	___	___
Errors:										
________________________	___	___	___	___	___	___	___	___	___	___
COPAL VARNISH										
Procedure completed.						___	___	___	___	___
Apply two coats of copal varnish to the walls and cavosurface margins of the cavity preparation.										
Errors:										
________________________						___	___	___	___	___
CUSTOM MATRIX AND WEDGE										
1. Matrix band adapts closely to the disto-facial cavosurface margins.	___	___	___	___	___	___	___	___	___	___
2. Matrix extends 0.5mm to 1mm apically to the gingival margin.	___	___	___	___	___	___	___	___	___	___
3. Matrix extends 2mm to 3mm facially beyond the distal and mesial embrasures.	___	___	___	___	___	___	___	___	___	___
4. Matrix does not impinge on gingival tissue.	___	___	___	___	___	___	___	___	___	___
Errors:										
1. Access to preparation impaired by matrix or compound.	___	___	___	___	___	___	___	___	___	___
2. Other:____________________	___	___	___	___	___	___	___	___	___	___
CONDENSATION										
1. Procedure completed.						___	___	___	___	___
a. Visualize the size and shape of the cavity preparation.										
b. Place and condense a first increment of amalgam in the distal extension of the preparation.										
c. Place and condense a second increment of amalgam in the distal area.										
d. Place and condense a third increment of amalgam in the mesial area.										
e. Place and condense a fourth increment of amalgam along the axial wall.										
f. Place and condense a fifth increment of amalgam.										
2. Cavosurface margins are covered.						___	___	___	___	___
3. The cavity preparation is slightly overfilled.						___	___	___	___	___
Errors:										
1. Cavity overfilled.						___	___	___	___	___
2. Cavity underfilled.						___	___	___	___	___
3. Other:____________________						___	___	___	___	___

Module XI
Page 2

____
Student's Name and Number

	Instructor Evaluation					Self Evaluation				
	Trials					Trials				
CARVING	1	2	3	4	5	1	2	3	4	5
1. Tooth structure and amalgam are flush along the cavosurface margins.										
2. The contour of the restoration approximates the original contour of the tooth.										
3. Surface of the restoration is a consistent texture.										
Errors:										
1. Non-improvable submarginal areas.										
2. Overextensions.										
3. Open margin.										
4. Other:______________________										
FINISHING AND POLISHING										
1. Tooth structure and amalgam are flush at the margins.										
2. Contour of restoration approximates the original contour of tooth.										
3. The restoration is smooth and shiny.										
Errors:										
1. Submarginal area.										
2. Voids exposed.										
3. Other:______________________										

APPENDIX

B

Criteria for Evaluation of Test Restoration, Modules I and II

Test
Modules I and II, p. 2

Student's Name No.

Student Directions:

When the manikin has been prepared and all of the supplies and equipment are ready, the instructor will tell you to begin the restoration procedures. He will keep track of the time. Notify him as soon as you finish the procedure and he will record the actual working time on the evaluation sheet. Evaluate your restoration, fold the student column under, and ask the instructor to evaluate.

II. Restoration of a Class I Facial Pit Cavity Preparation

C=criterion met; I=improvable; X=not improvable.

	INSTRUCTOR	STUDENT
CARVING		
1. Tooth structure and amalgam are flush along margins.	____	____
2. Contour of restoration approximates original contour of tooth.	____	____
3. Surface of the restoration has a consistent texture.	____	____
4. Copal varnish through carving completed in eight minutes.	____	____
Errors:		
1. Submarginal area.	____	____
2. Amalgam overextended in facial groove.	____	____
3. Other amalgam overextensions.	____	____
4. Facial groove too deep.	____	____
5. Facial groove too shallow.	____	____
6. Other:________________________	____	____
FINISHING		
1. Tooth structure and amalgam are flush at the margins.	____	____
2. Contour of restoration approximates original contour of the tooth.	____	____
3. Surface of restoration has a consistent texture.	____	____
Errors:		
1. Facial groove too deep.	____	____
2. Facial groove too shallow.	____	____
3. Overextensions.	____	____
4. Other:________________________	____	____
POLISHING		
1. Amalgam is smooth and shiny.	____	____
2. Finishing and polishing completed in five minutes.	____	____

Actual Working Time:

Copal varnish through carving completed in _____minutes and _____ seconds.

Finishing and polishing completed in _____minutes and _____seconds.

APPENDIX

C

Written Test, Modules I and II

Test
Modules I and II

Student's Name No.

Student Directions:

Success on this test will be determined in four ways: how completely you answer the questions in Part I; how accurately you evaluate your restoration; the length of time it took you to complete the restoration; and the quality of the restoration.

I. Background Information

A. Why is copal varnish used?

B. What are the purposes of condensing amalgam?

C. What is the reason for overfilling the cavity preparation with amalgam?

D. What two purposes does carving serve?

E. What defects make it necessary to remove an amalgam restoration that has just been placed?

F. What are the reasons for finishing and polishing an amalgam restoration?

APPENDIX

D

Criteria for Evaluation of Test Restorations,

Modules III through VI

APPENDIX

D

Criteria for Evaluation of Test Restoration, Modules III through VI

Test
Modules III through VI

Student's Name and Number

Student Directions:

When the rubber dam is in place and all of the equipment and supplies are ready, the instructor will signal to begin. Complete the restoration, record actual working time, evaluate, and request instructor evaluation.

B. Class IV Mesio-Incisal Cavity Preparation Restored with Filled Resin

C=criterion met; I=improvable; X=not improvable.

FINISHING	INSTRUCTOR	STUDENT
1. Margins and tooth structure are flush at the cavosurface margins.	____	____
2. Restoration is smooth, without visible scratches.	____	____
3. Restoration reproduces the original contour of the tooth.	____	____
4. Contact exists between the restoration and adjacent tooth in the incisal one third of the crown.	____	____
5. Restoration completed in 20 minutes.	____	____
Errors: ______________________________	____	____
OCCLUSION		
Restoration is out of occlusion.	____	____
Errors: ______________________________	____	____

Actual Working Time:

Restoration completed in ______ minutes and ______ seconds.

APPENDIX

E

Written Test, Modules III through VI

Student's Name

TEST
Modules III through VI

I. Background Information

A. What is the purpose of a calcium hydroxide liner restoration with tooth-colored materials?

B. Why is calcium hydroxide liner used in restorations with tooth-colored materials instead of copal varnish, which is used with amalgam restorations?

C. Copal varnish is applied to the walls and cavosurface margins of a preparation. Why is calcium hydroxide liner applied only to the enamel walls?

D. Why must increments of unfilled resin be placed at 15-second intervals?

E. What is the purpose of the protective film applied to restorations of tooth-colored materials?

F. In removing flash from restorations with tooth-colored materials, the operator cuts from restoration to tooth rather than from tooth structure to restoration as in amalgam restorations. Why?

G. What is the one outstanding advantage of silicate cement as a restorative material?

H. How do filled and unfilled resin differ?

I. Why should a Class IV mesio-incisal restoration be out of occlusion?

II. Restorations

A. Restore with unfilled resin a Class V facial cavity preparation on tooth #6/13 according to the criteria. The gingival retractor must be placed in five minutes, the restorative procedures completed in 21 minutes.

B. Restore with filled resin a Class IV mesio-incisal cavity preparation on tooth #8/11 according to the criteria in 20 minutes.

APPENDIX

F

Criteria for Evaluation of Final Exam Restoration

FINAL TEST

____
Student's Name and Number

1. Restore a Class I occlusal cavity preparation in pre-prepared tooth #30/46 with amalgam.

C= criterion met; I= improvable; X= not improvable.

Note any error and whether it's improvable or not improvable.

CARVING	INSTRUCTOR	STUDENT
1. Tooth surface and amalgam are flush at the cavosurface margins.	____	____
2. Contour of the restoration approximates original contour of the tooth.	____	____
3. Surface of the restoration is a consistent texture.	____	____
4. Copal varnish through carving completed in 8 minutes.	____	____
Errors:		
1. Mesial or distal pits improperly placed.	____	____
2. Non-improvable submarginal area.	____	____
3. Open margin.	____	____
4. Other:______________________________	____	____

FINISHING AND POLISHING		
1. Tooth surface and amalgam are flush at the cavosurface margins.	____	____
2. Contour of the restoration approximates the contour of the original tooth.	____	____
3. Restoration is smooth and shiny.	____	____
4. Centric markings on the restoration, the tooth, and the adjacent teeth are of the same density.	____	____
5. The restoration is free of excursive contacts.	____	____
6. Finishing and polishing completed in 5 minutes.	____	____
Errors:		
1. Detail of carving polished out.	____	____
2. Other:______________________________	____	____

Actual Working Time:

Copal varnish through carving completed in_____minutes. and_____seconds.

Finishing and polishing completed in_____minutes, and_____seconds.

FINAL TEST

____
Student Name and Number

2. Restore a Class II mesio-occlusal cavity preparation in pre-prepared tooth #3/16 with amalgam.

C= criterion met; I= improvable; X= not improvable.

Note any error and whether it's improvable or not improvable.

CARVING	INSTRUCTOR	STUDENT
1. Tooth surface and amalgam are flush at the cavosurface margins.	___	___
2. Contour of the restoration approximates the original contour of the tooth.	___	___
3. Proximal contact is reestablished.	___	___
4. Surface of the restoration is a consistent texture.	___	___
Errors:		
1. Mesial or central pit improperly placed.	___	___
2. Non-improvable submarginal area.	___	___
3. Open margin.	___	___
4. Marginal ridge overcarved.	___	___
5. Other: ______________________	___	___
ADJUSTING OCCLUSION		
1. Centric markings on restoration, tooth, and adjacent teeth are of the same density.	___	___
2. Restoration is free of excursive contacts.	___	___
3. Copal varnish through adjusting occlusion completed in 13 minutes.	___	___
Errors:		
______________________________	___	___
FINISHING AND POLISHING		
1. Tooth structure and amalgam are flush at the margins.	___	___
2. Contour of the restoration approximates the original contour of the tooth.	___	___
3. Centric markings on the restoration, tooth, and adjacent teeth are of the same density.	___	___
4. Restoration is free of excursive contacts.	___	___
5. Proximal contact is present.	___	___
6. The restoration is smooth and shiny.	___	___
7. Finishing and polishing and adjusting occlusion completed in 5 minutes.	___	___
Errors:		
1. Detail of carving polished out.	___	___
2. Other: ______________________	___	___

Actual Working Time:

Copal varnish through carving completed in____minutes, and____seconds.

Finishing and polishing completed in____minutes, and____seconds.

FINAL TEST

____
Student Name and Number

3. Restore a Class III disto-lingual cavity preparation in pre-prepared tooth #6/13 with filled resin.

C= criterion met; I= improvable; X= not improvable.

Note any error and whether it's improvable or not improvable.

FINISHING	INSTRUCTOR	STUDENT
1. Margins and tooth surface are flush at the cavosurface margins.	____	____
2. Restoration is smooth.	____	____
3. Restoration reproduces the original contour of the tooth.	____	____
4. Contact exists between the restoration and the adjacent tooth in the incisal one third of the crown.	____	____
5. Entire restorative procedure completed in 25 minutes.	____	____
Errors:		
1. Scratches on the surface of the restoration.	____	____
2. Pits and voids in the restoration.	____	____
3. Other: ______________________________	____	____

Actual Working Time:

Matrix was placed in _____ minutes, and _____ seconds.

Restoration was placed in _____ minutes, and _____ seconds.

STUDENT DIRECTIONS

Part I of this test is concerned with background knowledge of the procedures and should be completed first. Part II is the practical application of your knowledge and a demonstration of your skill in placing restorations.

Since you will not have had practice in restoring these particular pre-prepared cavity preparations, you should carefully study the anatomy of an unprepared tooth of the same number before beginning the procedure. Even though you have not practiced these restorations, you should be able to restore the teeth according to the criteria; no new skills are needed.

PART I

FINAL TEST

Student Name and Number

A. Answer the following questions in relation to restoring tooth #6/13, a Class III disto-lingual cavity preparation, with filled resin.

1. Why is the matrix required?

2. Describe the matrix you would use and explain your choice.

3. Describe the technique you would use for placing filled resin and explain your choice.

PART B

B. Answer the following questions in relation to restoring tooth #30/46, a Class I occlusal cavity preparation, with amalgam.

1. When is occlusion adjusted?

2. What procedures are used to eliminate undesired contacts?

3. State the criterion for centric contacts on this tooth when the finishing and polishing is completed.

4. State the criterion for excursive contacts on this tooth when the finishing and polishing is completed.

APPENDIX

G

Interrater Reliabilities and Summary of Ratings, Summarized by Module by Field Test Group

Table Number Index for Appendix G

Module	Eastern Washington		University of Washington		Clark College
	Group 1	Group 2	Group 1	Group 2	
I	22	23	24	25	26
II	27	28	29	30	31
III	32	33	34	35	36
IV	37	38	39	40	41
V	42	43	44	45	46
VI	47	48	49	50	51
VII	52	53	54	55	56
VIII	57	58	59	60	61
IXa	62	63	64	65	66
IXb	67	68	69	70	71
X	72	73	74	75	76
XI	77	78	79	80	81

Table 22

Interrater Reliabilities and Summary of Ratings
Module I, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	8	1	1	10	f	10	-	-
		%	80	10	10		%	100	-	-
I, O_1	10	f	7	1	2	10	f	7	3	-
		%	70	10	20		%	70	30	-
I, O_2	10	f	5	4	1	10	f	6	4	-
		%	50	40	10		%	60	40	-
S, O_1	10	f	6	3	1	10	f	7	3	-
		%	60	30	10		%	70	30	-
S, O_2	10	f	6	3	1	10	f	6	4	-
		%	60	30	10		%	60	40	-
O_1, O_2	10	f	8	2	-	10	f	7	3	-
		%	80	20	-		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	9	9	7	5	10	10	7	6
I	-	1	2	4	-	-	3	4
X	1	-	1	1	-	-	-	-
No Rating	-	-	-	-	-	-	-	-

Table 23

Interrater Reliabilities and Summary of Ratings Module I, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	7	3	-	9	f	6	3	-
		%	70	30	-		%	67	33	-
I, O_1	10	f	4	5	1	9	f	4	3	2
		%	40	50	10		%	44	33	22
I, O_2	10	f	3	5	2	9	f	5	3	1
		%	30	50	20		%	56	33	11
S, O_1	10	f	5	4	1	9	f	4	4	1
		%	50	40	10		%	44	44	11
S, O_2	10	f	5	4	1	9	f	5	4	-
		%	50	40	10		%	56	44	-
O_1, O_2	10	f	6	-	4	9	f	8	-	1
		%	60	-	40		%	89	-	11

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
	4	5	10	6	2	2	6	5
[illegible]	5	4	-	-	3	4	1	-
X	1	1	-	4	4	3	3	4
No Rating	-	-	-	-	1	1	-	1

Table 24

Interrater Reliabilities and Summary of Ratings Module I, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	5	5	-	8	f	6	2	-
		%	50	50	-		%	75	25	-
I, O_1	9	f	5	4	-	8	f	2	6	-
		%	56	44	-		%	25	75	-
I, O_2	9	f	3	4	2	8	f	3	5	-
		%	33	44	22		%	38	63	-
S, O_1	9	f	2	7	-	8	f	3	4	1
		%	22	78	-		%	38	50	13
S, O_2	9	f	3	5	1	8	f	4	3	1
		%	33	56	11		%	50	38	13
O_1, O_2	8	f	6	1	1	10	f	7	3	-
		%	75	13	13		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	4	2	7	7	3	4	8	8
I	4	5	2	2	5	3	1	2
X	2	3	-	-	-	1	1	-
No Rating	-	-	1	1	2	2	-	-

Table 25

Interrater Reliabilities and Summary of Ratings
Module I, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	6	4	-	10	f	8	2	-
		%	60	40	-		%	80	20	-
I, 0_1	10	f	5	5	-	10	f	6	3	1
		%	50	50	-		%	60	30	10
I, 0_2	10	f	5	5	-	10	f	8	2	-
		%	50	50	-		%	80	20	-
S, 0_1	10	f	5	5	-	10	f	6	3	1
		%	50	50	-		%	60	30	10
S, 0_2	10	f	5	5	-	10	f	6	4	-
		%	50	50	-		%	60	40	0
0_1, 0_2	10	f	10	-	-	10	f	7	3	-
		%	100	-	-		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
0	5	5	10	10	6	6	8	7
1	5	5	-	-	3	3	2	3
2	[illegible]	[illegible]	-	-	1	1	-	-
No Rating	-	-	-	-	-	-	-	-

Table 26

Interrater Reliabilities and Summary of Ratings
Module I, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	16	f	12	2	2	13	f	10	2	1
		%	75	13	13		%	77	15	8
I, O_1	16	f	11	4	1	15	f	7	7	1
		%	69	25	6		%	47	47	7
I, O_2	15	f	12	2	1	13	f	8	5	-
		%	80	13	7		%	62	39	-
S, O_1	17	f	9	6	2	14	f	6	6	2
		%	53	35	12		%	43	43	14
S, O_2	16	f	12	3	1	13	f	7	5	1
		%	75	19	6		%	54	39	8
O_1, O_2	17	f	11	6	-	16	f	13	3	-
		%	65	35	-		%	81	19	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	13	12	13	11	11	9	11	12
I	2	4	2	5	3	3	4	4
X	3	2	3	1	1	3	3	-
No Rating	-	-	-	1	2	3	-	2

Table 27

Interrater Reliabilities and Summary of Ratings
Module II, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	5	1	4	10	f	8	2	-
		%	50	10	40		%	80	20	-
I, 0_1	9	f	5	3	1	9	f	5	3	1
		%	56	33	11		%	56	33	11
I, 0_2	5	f	-	5	-	9	f	2	7	-
		%	-	100	-		%	22	78	-
S, 0_1	9	f	5	1	3	9	f	7	1	1
		%	56	11	33		%	78	11	11
S, 0_2	5	f	-	5	-	9	f	3	5	1
		%	-	100	-		%	33	56	11
0_1, 0_2	5	f	1	4	-	9	f	4	4	1
		%	20	80	-		%	44	44	11

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	2	6	5	-	8	8	6	2
I	1	-	1	5	1	1	2	6
X	7	4	3	-	1	1	1	1
No Rating	-	-	1	5	-	-	1	1

Table 28

Interrater Reliabilities and Summary of Ratings
Module II, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	9	f	6	1	2	10	f	4	5	1
		%	67	11	22		%	40	50	10
I, O_1	2	f	1	1	-	7	f	6	-	1
		%	50	50	-		%	86	-	14
I, O_2	3	f	-	3	-	5	f	1	4	-
		%	-	100	-		%	20	80	-
S, O_1	2	f	1	-	1	7	f	3	4	-
		%	50	-	50		%	43	57	-
S, O_2	3	f	1	2	-	5	f	2	3	-
		%	33	67	-		%	40	60	-
O_1, O_2	2	f	1	1	-	5	f	1	4	-
		%	50	50	-		%	20	80	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	2	1	1	-	5	2	3	1
I	-	1	1	3	-	5	-	4
X	7	7	-	-	5	3	4	-
No Rating	1	1	8	7	-	-	3	5

Table 29

Interrater Reliabilities and Summary of Ratings
Module II, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	8	f	7	1	-	9	f	4	5	-
		%	88	13	-		%	44	56	-
I, O_1	8	f	2	5	1	9	f	6	3	-
		%	25	63	13		%	67	33	-
I, O_2	8	f	5	2	1	7	f	4	3	-
		%	63	25	13		%	57	43	-
S, O_1	9	f	2	7	-	9	f	3	6	-
		%	22	78	-		%	33	67	-
S, O_2	8	f	5	3	-	7	f	4	3	-
		%	63	38	-		%	57	43	-
O_1, O_2	9	f	3	6	-	8	f	4	4	-
		%	33	67	-		%	50	50	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	2	1	4	-	3	2	4	-
I	3	4	3	6	4	5	6	8
X	3	4	3	3	2	2	-	-
No Rating	2	1	-	1	1	1	-	2

Table 30

Interrater Reliabilities and Summary of Ratings Module II, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	6	3	1	10	f	5	5	-
		%	60	30	10		%	50	50	-
I, O_1	10	f	7	1	2	10	f	6	4	-
		%	70	10	20		%	60	40	-
I, O_2	9	f	3	6	-	10	f	4	6	-
		%	33	67	-		%	40	60	-
S, O_1	10	f	7	2	1	10	f	7	3	-
		%	70	20	10		%	70	30	-
S, O_2	9	f	4	5	-	10	f	5	5	-
		%	44	56	-		%	50	50	-
O_1, O_2	9	f	3	5	1	10	f	2	8	-
		%	33	56	11		%	20	80	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	5	6	-	7	5	8	1
I	1	2	2	7	3	4	1	9
X	3	3	2	2	-	1	1	-
No Rating	-	-	-	1	-	-	-	-

Table 31

Interrater Reliabilities and Summary of Ratings
Module II, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	13	f	13	-	-	13	f	8	5	-
		%	100	-	-		%	62	39	-
I, O_1		f					f			
		%					%			
I, O_2		f					f			
		%					%			
S, O_1		f					f			
		%					%			
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

NO OBSERVER RATINGS

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	6	-	-	9	8	-	-
I	2	3	-	-	2	6	-	-
X	6	8	-	-	3	2	-	-
No Rating	5	2	19	19	5	3	19	19

Table 32

Interrater Reliabilities and Summary of Ratings
Module III, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	9	f	8	1	-	8	f	7	1	-
		%	89	11	-		%	88	13	-
I, O_1	9	f	3	5	1	8	f	3	5	-
		%	33	56	11		%	38	63	-
I, O_2	9	f	4	4	1	8	f	4	4	-
		%	44	44	11		%	50	50	-
S, O_1	9	f	2	6	1	8	f	2	6	-
		%	22	67	11		%	25	75	-
S, O_2	9	f	3	5	1	8	f	3	5	-
		%	33	56	11		%	38	63	-
O_1, O_2	9	f	8	1	-	8	f	7	1	-
		%	89	11	-		%	88	13	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	8	7	4	4	7	8	2	3
I	-	-	5	4	1	-	6	5
X	1	1	1	1	-	-	1	-
No Rating	1	1	-	1	2	2	1	2

Table 33

Interrater Reliabilities and Summary of Ratings
Module III, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	7	3	-	9	f	8	1	-
		%	70	30	-		%	89	11	-
I, O_1	10	f	5	4	1	9	f	4	5	-
		%	50	40	10		%	44	56	-
I, O_2	9	f	3	6	-	9	f	3	6	-
		%	33	67	-		%	33	67	-
S, O_1	10	f	4	5	1	9	f	5	4	-
		%	40	50	10		%	56	44	-
S, O_2	9	f	6	3	-	9	f	4	4	1
		%	67	33	-		%	44	44	11
O_1, O_2	9	f	7	2	-	9	f	7	2	-
		%	78	22	-		%	78	22	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	4	1	-	6	5	1	1
I	4	5	8	8	3	4	8	6
X	-	1	1	1	-	-	-	2
No Rating	-	-	-	1	1	1	1	1

Table 34

Interrater Reliabilities and Summary of Ratings
Module III, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	8	1	1	10	f	8	2	-
		%	80	10	10		%	80	20	-
I, O_1	10	f	6	3	1	10	f	7	3	-
		%	60	30	10		%	70	30	-
I, O_2	10	f	6	3	1	10	f	7	3	-
		%	60	30	10		%	70	30	-
S, O_1	10	f	8	2	-	10	f	7	3	-
		%	80	20	-		%	70	30	-
S, O_2	10	f	8	2	-	10	f	5	5	-
		%	80	20	-		%	50	50	-
O_1, O_2	10	f	8	2	-	10	f	8	2	-
		%	80	20	-		%	80	20	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	4	2	3	3	4	5	3	2
I	5	6	4	6	5	3	6	8
X	1	2	3	1	1	2	1	-
No Rating	-	-	-	-	-	-	-	-

Table 35

Interrater Reliabilities and Summary of Ratings
Module III, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	8	f	6	-	2	8	f	6	1	1
		%	75	-	25		%	75	13	13
I, 0_1	8	f	4	3	1	8	f	2	6	-
		%	50	38	13		%	25	75	-
I, 0_2	8	f	4	4	-	8	f	2	6	-
		%	50	50	-		%	25	75	-
S, 0_1	9	f	6	3	-	9	f	2	6	1
		%	67	33	-		%	22	67	11
S, 0_2	9	f	5	4	-	9	f	2	6	1
		%	56	44	-		%	22	67	11
0_1, 0_2	10	f	9	1	-	10	f	9	1	-
		%	90	10	-		%	90	10	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	4	2	2	2	5	5	1	1
I	4	5	5	6	3	2	8	9
X	-	2	3	2	-	2	1	-
No Rating	2	1	-	-	2	1	-	-

Table 36

Interrater Reliabilities and Summary of Ratings
Module III, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	17	f	11	6	-	14	f	11	3	-
		%	65	35	-		%	79	21	-
I, O_1	17	f	6	11	-	14	f	4	9	1
		%	35	65	-		%	29	64	7
I, O_2	16	f	5	10	1	15	f	5	10	-
		%	31	63	6		%	33	67	-
S, O_1	18	f	8	9	1	16	f	5	10	1
		%	44	50	6		%	31	63	6
S, O_2	18	f	7	9	2	16	f	4	12	-
		%	39	50	11		%	25	75	-
O_1, O_2	18	f	16	2	-	17	f	15	2	-
		%	89	11	-		%	88	12	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
0	13	12	4	4	14	12	4	5
1	2	4	11	11	-	3	12	13
X	2	3	3	3	1	1	1	-
No Rating	2	-	1	1	4	3	2	1

Table 37

Interrater Reliabilities and Summary of Ratings Module IV, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	-	1	10	f	6	3	1
		%	90	-	10		%	60	30	10
I, 0_1	10	f	4	6	-	10	f	4	6	-
		%	40	60	-		%	40	60	-
I, 0_2	10	f	4	6	-	10	f	6	4	-
		%	40	60	-		%	60	40	-
S, 0_1	10	f	3	6	1	10	f	3	7	-
		%	30	60	10		%	30	70	-
S, 0_2	10	f	3	6	1	10	f	5	5	-
		%	30	60	10		%	50	50	-
0_1, 0_2	10	f	10	-	-	10	f	8	2	-
		%	100	-	-		%	80	20	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	9	10	3	3	7	9	3	5
I	-	-	6	6	3	-	7	5
X	1	-	1	1	-	1	-	-
No Rating	-	-	-	-	-	-	-	-

Table 38

Interrater Reliabilities and Summary of Ratings
Module IV, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	9	f	7	2	-	9	f	7	2	-
		%	78	22	-		%	78	22	-
I, O_1	9	f	3	6	-	10	f	5	4	1
		%	33	67	-		%	50	40	10
I, O_2	9	f	3	6	-	10	f	6	4	-
		%	33	67	-		%	60	40	-
S, O_1	9	f	3	6	-	9	f	4	4	1
		%	33	67	-		%	44	44	11
S, O_2	9	f	3	6	-	9	f	5	4	-
		%	33	67	-		%	56	44	-
O_1, O_2	10	f	10	-	-	10	f	7	2	1
		%	100	-	-		%	70	20	10

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	7	2	2	6	6	2	4
I	1	1	7	7	1	1	5	5
X	1	1	1	1	3	2	3	1
No Rating	1	1	-	-	-	1	-	-

Table 39

Interrater Reliabilities and Summary of Ratings
Module IV, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	8	2	-	9	f	8	1	-
		%	80	20	-		%	89	11	-
I, O_1	10	f	6	4	-	10	f	7	2	1
		%	60	40	-		%	70	20	10
I, O_2	10	f	5	5	-	10	f	6	3	1
		%	50	50	-		%	60	30	10
S, O_1	10	f	7	2	1	9	f	7	1	1
		%	70	20	10		%	78	11	11
S, O_2	10	f	6	3	1	9	f	6	2	1
		%	60	30	10		%	67	22	11
O_1, O_2	10	f	9	1	-	10	f	9	1	-
		%	90	10	-		%	90	10	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	7	8	7	8	7	8	7
I	3	3	1	2	-	1	2	3
X	-	-	1	1	2	1	-	-
No Rating	-	-	-	-	-	1	-	-

Table 40

Interrater Reliabilities and Summary of Ratings Module IV, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	7	2	1	10	f	10	-	-
		%	70	20	10		%	100	-	-
I, O_1	10	f	5	2	3	10	f	6	2	2
		%	50	20	30		%	60	20	20
I, O_2	10	f	5	2	3	10	f	7	1	2
		%	50	20	30		%	70	10	20
S, O_1	10	f	6	2	2	10	f	6	2	2
		%	60	20	20		%	60	20	20
S, O_2	10	f	6	2	2	10	f	7	1	2
		%	60	20	20		%	70	10	20
O_1, O_2	10	f	10	-	-	10	f	9	1	-
		%	100	-	-		%	90	10	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	9	7	7	9	9	7	8
I	2	-	2	2	-	-	2	1
X	2	1	1	1	1	1	1	1
No Rating	-	-	-	-	-	-	-	-

Table 41

Interrater Reliabilities and Summary of Ratings
Module IV, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	12	f	12	-	-	12	f	11	1	-
		%	100	-	-		%	92	8	-
I, O_1	14	f	10	4	-	13	f	8	3	2
		%	71	29	-		%	62	23	15
I, O_2	14	f	12	2	-	13	f	12	-	1
		%	86	14	-		%	92	-	8
S, O_1	12	f	8	4	-	13	f	8	3	2
		%	67	33	-		%	62	23	15
S, O_2	12	f	10	2	-	13	f	10	2	1
		%	83	17	-		%	77	15	8
O_1, O_2	19	f	17	2	-	19	f	15	4	-
		%	89	11	-		%	79	21	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	10	8	8	10	11	10	8	11
I	1	1	6	4	1	2	6	5
X	3	3	5	5	1	1	5	3
No Rating	5	7	-	-	6	6	-	-

Table 42

Interrater Reliabilities and Summary of Ratings
Module V, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	-	1	9	f	7	1	1
		%	90	-	10		%	78	11	11
I, O_1	10	f	5	4	1	9	f	3	3	3
		%	50	40	10		%	33	33	33
I, O_2	10	f	6	2	2	10	f	5	3	2
		%	60	20	20		%	50	30	20
S, O_1	10	f	5	4	1	8	f	1	4	3
		%	50	40	10		%	13	50	38
S, O_2	10	f	7	2	1	9	f	3	3	3
		%	70	20	10		%	33	33	33
O_1, O_2	10	f	6	4	-	9	f	8	1	-
		%	60	40	-		%	89	11	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	5	6	2	5	6	8	2	3
I	-	-	4	2	1	-	4	3
X	5	4	4	3	3	1	3	4
No Rating	-	-	-	-	-	1	1	-

Table 43

Interrater Reliabilities and Summary of Ratings
Module V, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	8	1	1	10	f	9	1	-
		%	80	10	10		%	90	10	-
I, 0_1	10	f	7	3	-	10	f	5	4	1
		%	70	30	-		%	50	40	10
I, 0_2	10	f	9	1	-	10	f	7	2	1
		%	90	10	-		%	70	20	10
S, 0_1	10	f	5	4	1	10	f	6	3	1
		%	50	40	10		%	60	30	10
S, 0_2	10	f	7	2	1	10	f	6	3	1
		%	70	20	10		%	60	30	10
0_1, 0_2	10	f	8	2	-	10	f	8	2	-
		%	80	20	-		%	80	20	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	9	9	6	8	10	9	5	7
I	-	1	3	1	-	1	4	2
X	1	-	1	1	-	-	1	1
No Rating	-	-	-	-	-	-	-	-

Table 44

Interrater Reliabilities and Summary of Ratings
Module V, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	1	-	10	f	9	1	-
		%	90	10	-		%	90	10	-
I, O_1	10	f	8	2	-	10	f	8	2	-
		%	80	20	-		%	80	20	-
I, O_2	10	f	8	2	-	10	f	8	2	-
		%	80	20	-		%	80	20	-
S, O_1	10	f	9	1	-	10	f	9	1	-
		%	90	10	-		%	90	10	-
S, O_2	10	f	9	1	-	10	f	9	1	-
		%	90	10	-		%	90	10	-
O_1, O_2	10	f	10	-	-	10	f	10	-	-
		%	100	-	-		%	100	-	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	9	8	9	9	8	9	10	10
I	1	2	1	1	2	1	-	-
X	-	-	-	-	-	-	-	-
No Rating	-	-	-	-	-	-	-	-

Table 45

Interrater Reliabilities and Summary of Ratings
Module V, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	10	-	-	10	f	9	1	-
		%	100	-	-		%	90	10	-
I, O_1	10	f	7	2	1	10	f	8	-	2
		%	70	20	10		%	80	-	20
I, O_2	10	f	9	-	1	10	f	8	-	2
		%	90	-	10		%	80	-	20
S, O_1	10	f	7	2	1	10	f	7	1	2
		%	70	20	10		%	70	10	20
S, O_2	10	f	9	-	1	10	f	7	1	2
		%	90	-	10		%	70	10	20
O_1, O_2	10	f	8	2	-	10	f	10	-	-
		%	80	20	-		%	100	-	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	8	8	5	7	9	8	9	9
I	-	-	2	-	-	1	-	1
X	2	2	3	3	1	1	1	-
No Rating	-	-	-	-	-	-	-	-

Table 46

Interrater Reliabilities and Summary of Ratings
Module V, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	17	f	17	-	-	16	f	15	-	1
		%	100	-	-		%	94	-	6
I, 0_1	17	f	15	2	-	17	f	15	-	2
		%	88	12	-		%	88	-	12
I, 0_2	17	f	15	2	-	17	f	15	-	2
		%	88	12	-		%	88	-	12
S, 0_1	18	f	16	2	-	17	f	16	-	1
		%	89	11	-		%	94	-	6
S, 0_2	18	f	16	2	-	17	f	16	-	1
		%	89	11	-		%	94	-	6
0_1, 0_2	18	f	18	-	-	18	f	18	-	-
		%	100	-	-		%	100	-	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	14	15	15	15	12	13	15	15
I	1	1	1	1	-	-	-	-
X	2	2	2	2	5	4	3	3
No Rating	2	1	1	1	2	2	1	1

Table 47

Interrater Reliabilities and Summary of Ratings
Module VI, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	1	-	9	f	6	1	2
		%	90	10	-		%	67	11	22
I, O_1	10	f	2	7	1	10	f	1	7	2
		%	20	70	10		%	10	70	20
I, O_2	10	f	2	7	1	10	f	2	7	1
		%	20	70	10		%	20	70	10
S, O_1	10	f	3	6	1	9	f	-	6	3
		%	30	60	10		%	-	67	33
S, O_2	10	f	3	6	1	9	f	-	8	1
		%	30	60	10		%	-	89	11
O_1, O_2	10	f	10	-	-	10	f	8	2	-
		%	100	-	-		%	80	20	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	8	7	-	7	6	9	-	-
I	-	1	7	3	1	-	6	8
X	2	2	3	-	3	-	4	2
No Rating	-	-	-	-	-	1	-	-

Table 48

Interrater Reliabilities and Summary of Ratings
Module VI, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	9	f	6	1	2	10	f	5	5	-
		%	67	11	22		%	50	50	-
I, O_1	8	f	3	5	-	10	f	4	5	1
		%	38	63	-		%	40	50	10
I, O_2	9	f	4	5	-	10	f	3	6	1
		%	44	56	-		%	30	60	10
S, O_1	8	f	1	6	1	10	f	2	6	2
		%	13	75	13		%	20	60	20
S, O_2	9	f	2	6	1	10	f	3	5	2
		%	22	67	11		%	30	50	20
O_1, O_2	9	f	9	-	-	10	f	9	1	-
		%	100	-	-		%	90	10	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	2	5	-	-	4	7	3	4
I	3	2	6	6	6	3	5	4
X	4	2	3	1	-	-	2	2
No Rating	1	1	1	-	-	-	-	-

Table 49

Interrater Reliabilities and Summary of Ratings Module VI, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	4	3	3	9	f	6	2	1
		%	40	30	30		%	67	22	11
I, O_1	10	f	5	5	-	10	f	5	5	-
		%	50	50	-		%	50	50	-
I, O_2	10	f	4	6	-	10	f	7	3	-
		%	40	60	-		%	70	30	-
S, O_1	10	f	5	2	3	9	f	2	5	2
		%	50	20	30		%	22	56	22
S, O_2	10	f	4	3	3	9	f	4	3	2
		%	40	30	30		%	44	33	22
O_1, O_2	10	f	9	1	-	10	f	6	4	-
		%	90	10	-		%	60	40	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	5	3	3	4	5	6	1	4
I	4	3	5	4	5	2	8	4
X	1	4	2	2	-	1	1	2
No Rating	-	-	-	-	-	1	-	-

Table 50

Interrater Reliabilities and Summary of Ratings Module VI, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	[redacted]	A	D_1	D_2	n	[redacted]	A	D_1	D_2
I, S	9	f	7	2	-	8	f	4	3	1
		%	78	22	-		%	50	38	13
I, O_1	9	f	1	7	1	9	f	3	5	1
		%	11	78	11		%	33	56	11
I, O_2	9	f	2	4	3	8	f	5	2	1
		%	22	44	33		%	63	25	13
S, O_1	10	f	3	6	1	9	f	3	6	-
		%	30	60	10		%	33	67	-
S, O_2	10	f	3	3	4	8	f	5	3	-
		%	30	30	40		%	63	38	-
O_1, O_2	10	f	6	3	1	9	f	7	2	-
		%	60	30	10		%	78	22	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	5	5	3	4	6	8	2	4
I	2	2	6	3	3	-	7	4
X	2	3	1	3	-	1	1	1
No Rating	1	-	-	-	1	1	-	1

Table 51

Interrater Reliabilities and Summary of Ratings
Module VI, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	13	f	11	2	-	14	f	11	2	1
		%	85	15	-		%	79	14	7
I, O_1	14	f	7	6	1	14	f	6	8	-
		%	50	43	7		%	43	57	-
I, O_2	14	f	6	7	1	14	f	7	7	-
		%	43	50	7		%	50	50	-
S, O_1	14	f	5	8	1	15	f	7	7	1
		%	36	57	7		%	47	47	7
S, O_2	14	f	4	9	1	15	f	8	6	1
		%	29	64	7		%	53	40	7
O_1, O_2	17	f	16	1	-	16	f	15	1	-
		%	94	6	-		%	94	6	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	12	10	6	5	12	11	8	9
I	1	3	8	9	1	2	8	7
X	1	1	3	3	1	2	-	-
No Rating	5	5	2	2	5	4	3	3

Table 52

Interrater Reliabilities and Summary of Ratings
Module VII, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	1	-	9	f	8	1	-
		%	90	10	-		%	89	11	-
I, O_1	10	f	2	7	1	9	f	2	6	1
		%	20	70	10		%	22	67	11
I, O_2	10	f	3	6	1	8	f	4	3	1
		%	30	60	10		%	50	38	13
S, O_1	10	f	3	6	1	9	f	1	7	1
		%	30	60	10		%	11	78	11
S, O_2	10	f	4	5	1	8	f	3	4	1
		%	40	50	10		%	38	50	13
O_1, O_2	10	f	9	1	-	8	f	6	2	-
		%	90	10	-		%	75	25	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	9	8	2	3	6	7	-	2
I	1	2	6	5	2	1	8	5
X	-	-	2	2	1	1	1	1
No Rating	-	-	-	-	1	1	1	2

Table 53

Interrater Reliabilities and Summary of Ratings
Module VII, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	5	5	-	10	f	7	3	-
		%	50	50	-		%	70	30	-
I, 0_1	1	f	-	1	-	1	f	1	-	-
		%	-	100	-		%	100	-	-
I, 0_2	1	f	-	1	-	1	f	1	-	-
		%	-	100	-		%	100	-	-
S, 0_1	1	f	-	1	-	1	f	1	-	-
		%	-	100	-		%	100	-	-
S, 0_2	1	f	-	1	-	1	f	1	-	-
		%	-	100	-		%	100	-	-
0_1, 0_2	1	f	1	-	-	1	f	1	-	-
		%	100	-	-		%	100	-	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	2	7	-	-	4	7	-	-
I	5	-	1	1	5	2	1	1
X	3	3	-	-	1	1	-	-
No Rating	-	-	9	9	-	-	9	9

Table 54

Interrater Reliabilities and Summary of Ratings
Module VII, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	8	f	4	4	-	6	f	5	1	-
		%	50	50	-		%	83	17	-
I, O_1	8	f	4	4	-	6	f	5	1	-
		%	50	50	-		%	83	17	-
I, O_2	8	f	4	4	-	6	f	4	2	-
		%	50	50	-		%	67	33	-
S, O_1	8	f	3	4	1	7	f	5	2	-
		%	38	50	13		%	71	29	-
S, O_2	9	f	4	4	1	7	f	6	1	-
		%	44	44	11		%	86	14	-
O_1, O_2	9	f	9	-	-	10	f	7	3	-
		%	100	-	-		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	4	3	4	4	4	6	6	8
I	3	3	5	5	1	-	4	1
X	1	3	-	1	1	1	-	1
No Rating	2	1	1	-	4	3	-	-

Table 55

Interrater Reliabilities and Summary of Ratings
Module VII, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	8	f	5	3	-	10	f	9	-	1
		%	63	38	-		%	90	-	10
I, 0_1	8	f	5	2	1	10	f	4	5	1
		%	63	25	13		%	40	50	10
I, 0_2	8	f	5	2	1	10	f	5	4	1
		%	63	25	13		%	50	40	10
S, 0_1	8	f	3	5	-	10	f	5	5	-
		%	38	63	-		%	50	50	-
S, 0_2	8	f	5	3	-	10	f	6	4	-
		%	63	38	-		%	60	40	-
0_1, 0_2	9	f	7	2	-	10	f	7	3	-
		%	78	22	-		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	5	5	5	7	7	8	5	8
I	2	3	4	2	2	2	5	2
X	1	-	1	-	1	-	-	-
No Rating	2	2	-	1	-	-	-	-

Table 56

Interrater Reliabilities and Summary of Ratings
Module VII, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	[redacted]	A	D_1	D_2	n	[redacted]	A	D_1	D_2
I, S	13	f	9	3	1	14	f	10	4	-
		%	69	23	8		%	71	29	-
I, 0_1	13	f	6	5	2	15	f	4	10	1
		%	46	39	15		%	27	67	7
I, 0_2	13	f	5	6	2	14	f	10	4	-
		%	39	46	15		%	71	29	-
S, 0_1	13	f	3	8	2	14	f	6	7	1
		%	23	62	15		%	43	50	7
S, 0_2	13	f	3	7	3	14	f	9	3	2
		%	23	54	23		%	64	22	14
0_1, 0_2	16	f	13	3	-	15	f	11	4	-
		%	81	19	-		%	73	27	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	9	8	5	8	13	10	3	7
I	2	3	8	5	2	4	10	6
X	2	2	3	3	-	-	2	3
No Rating	6	6	3	3	4	5	4	3

Table 57

Interrater Reliabilities and Summary of Ratings
Module VIII, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	[redacted]	A	D_1	D_2	n	[redacted]	A	D_1	D_2
I, S	9	f	7	2	-	10	f	9	1	-
		%					%			
I, O_1	9	f	2	7	-	10	f	1	9	-
		%					%			
I, O_2	9	f	2	7	-	10	f	2	8	-
		%					%			
S, O_1	9	f	-	9	-	10	f	-	10	-
		%					%			
S, O_2	9	f	-	9	-	10	f	1	9	-
		%					%			
O_1, O_2	9	f	9	-	-	10	f	9	1	-
		%					%			

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	9	-	9	9	10	10	1
I	2	-	9	-	1	-	-	9
X	-	-	1	-	-	-	-	-
No Rating	1	1	-	1	-	-	-	-

Table 58

Interrater Reliabilities and Summary of Ratings
Module VIII, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	5	5	-	10	f	6	4	-
		%	50	50	-		%	60	40	-
I, 0_1	10	f	4	5	1	10	f	6	4	-
		%	40	50	10		%	60	40	-
I, 0_2	10	f	7	3	-	10	f	5	5	-
		%	70	30	-		%	50	50	-
S, 0_1	10	f	1	8	1	10	f	2	8	-
		%	10	80	10		%	20	80	-
S, 0_2	10	f	4	6	-	10	f	3	7	-
		%	40	60	-		%	30	70	-
0_1, 0_2	10	f	4	6	-	10	f	5	5	-
		%	40	60	-		%	50	50	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	2	5	2	4	5	9	3	4
I	5	2	8	4	5	1	7	6
X	3	3	-	2	-	-	-	-
No Rating	-	-	-	-	-	-	-	-

Table 59

Interrater Reliabilities and Summary of Ratings
Module VIII, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	5	f	4	1	-	6	f	3	3	-
		%	80	20	-		%	50	50	-
I, O_1	7	f	4	3	-	8	f	4	4	-
		%	57	43	-		%	50	50	-
I, O_2	7	f	4	3	-	8	f	7	1	-
		%	57	43	-		%	88	13	-
S, O_1	6	f	1	5	-	6	f	1	5	-
		%	17	83	-		%	17	83	-
S, O_2	6	f	2	3	1	6	f	3	3	-
		%	33	50	17		%	50	50	-
O_1, O_2	10	f	5	5	-	10	f	7	3	-
		%	50	50	-		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	4	4	1	5	4	4	1	4
I	3	1	9	4	3	-	9	6
X	-	1	-	1	1	2	-	-
No Rating	3	4	-	-	2	4	-	-

Table 60

Interrater Reliabilities and Summary of Ratings
Module VIII, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	8	2	-	10	f	7	3	-
		%	80	20	-		%	70	30	-
I, O_1	10	f	4	6	-	10	f	6	4	-
		%	40	60	-		%	60	40	-
I, O_2	10	f	8	2	-	10	f	7	3	-
		%	80	20	-		%	70	30	-
S, O_1	10	f	6	4	-	10	f	5	5	-
		%	60	40	-		%	50	50	-
S, O_2	10	f	6	4	-	10	f	4	6	-
		%	60	40	-		%	40	60	-
O_1, O_2	10	f	4	6	-	10	f	5	5	-
		%	40	60	-		%	50	50	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	5	3	9	6	5	2	7
I	3	5	7	1	4	5	8	3
X	-	-	-	-	-	-	-	-
No Rating	-	-	-	-	-	-	-	-

Table 61

Interrater Reliabilities and Summary of Ratings
Module VIII, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	11	f	9	2	-	11	f	8	3	-
		%	82	18	-		%	73	27	-
I, O_1		f					f			
		%					%			
I, O_2		f					f			
		%					%			
S, O_1		f					f			
		%					%			
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

NO OBSERVER RATINGS

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	12	9	-	-	11	8	-	-
I	-	2	-	-	-	3	-	-
X	-	-	-	-	1	-	-	-
No Rating	7	8	19	19	7	8	19	19

Table 62

Interrater Reliabilities and Summary of Ratings
Module IXa, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	1	-	10	f	10	-	-
		%	90	10	-		%	100	-	-
I, O_1	10	f	1	5	4	10	f	3	6	1
		%	10	50	40		%	30	60	10
I, O_2	9	f	3	2	4	10	f	3	4	3
		%	33	22	44		%	30	40	30
S, O_1	10	f	1	6	3	10	f	3	6	1
		%	10	60	30		%	30	60	10
S, O_2	9	f	3	3	3	10	f	3	4	3
		%	33	33	33		%	30	40	30
O_1, O_2	9	f	5	3	1	10	f	1	8	1
		%	56	33	11		%	10	80	10

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	9	8	5	3	7	7	6	4
I	-	1	5	2	-	-	4	4
X	1	1	-	4	3	3	-	2
No Rating	-	-	-	1	-	-	-	-

Table 63

Interrater Reliabilities and Summary of Ratings
Module IXa, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	9	1	-	10	f	7	3	-
		%	90	10	-		%	70	30	-
I, O_1	10	f	3	4	3	10	f	4	5	1
		%	30	40	30		%	40	50	10
I, O_2	8	f	5	1	2	8	f	2	4	2
		%	63	13	25		%	25	50	25
S, O_1	10	f	3	3	4	10	f	4	4	2
		%	30	30	40		%	40	40	20
S, O_2	8	f	6	-	2	8	f	2	3	3
		%	75	-	25		%	25	38	38
O_1, O_2	8	f	3	3	2	8	f	1	5	2
		%	38	38	25		%	13	63	25

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	5	6	3	5	3	4	-	5
I	1	-	7	-	4	3	5	3
X	4	4	-	3	3	3	5	-
No Rating	-	-	-	2	-	-	-	2

Table 64

Interrater Reliabilities and Summary of Ratings Module IXa, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	8	f	8	-	-	7	f	5	2	-
		%	100	-	-		%	71	29	-
I, O_1	9	f	2	5	2	8	f	3	3	2
		%	22	56	22		%	38	38	25
I, O_2	8	f	7	1	-	8	f	5	3	-
		%	88	13	-		%	63	38	-
S, O_1	9	f	3	4	2	8	f	4	3	1
		%	33	44	22		%	50	38	13
S, O_2	7	f	6	1	-	7	f	4	3	-
		%	86	14	-		%	57	43	-
O_1, O_2	8	f	1	4	3	9	f	1	6	2
		%	13	50	38		%	11	67	22

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	5	1	7	5	4	1	8
I	2	2	3	1	2	2	5	1
X	1	2	6	-	1	2	3	-
No Rating	1	1	-	2	2	2	1	1

Table 65

Interrater Reliabilities and Summary of Ratings
Module IXa, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	5	5	-	10	f	8	2	-
		%	50	50	-		%	80	20	-
I, O_1	10	f	3	6	1	10	f	1	9	-
		%	30	60	10		%	10	90	-
I, O_2	10	f	6	4	-	10	f	8	2	-
		%	60	40	-		%	80	20	-
S, O_1	10	f	2	7	1	10	f	1	9	-
		%	20	70	10		%	10	90	-
S, O_2	10	f	7	3	-	10	f	8	2	-
		%	70	30	-		%	80	20	-
O_1, O_2	10	f	-	8	2	10	f	-	9	1
		%	-	80	20		%	-	90	10

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	7	-	10	8	8	-	10
I	4	3	8	-	2	2	9	-
X	-	-	2	-	-	-	1	-
No Rating	-	-	-	-	-	-	-	-

Table 66

Interrater Reliabilities and Summary of Ratings
Module IXa, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	12	f	12	-	-	11	f	10	1	-
		%	100	-	-		%	91	9	-
I, O_1	12	f	5	5	2	12	f	2	10	-
		%	42	42	17		%	17	83	-
I, O_2	7	f	6	1	-	11	f	9	2	-
		%	86	14	-		%	82	18	-
S, O_1	13	f	5	6	2	12	f	3	9	-
		%	39	46	15		%	25	75	-
S, O_2	7	f	6	1	-	9	f	8	1	-
		%	86	14	-		%	89	11	-
O_1, O_2	8	f	2	4	2	12	f	2	10	-
		%	25	50	25		%	17	83	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	8	-	6	10	9	-	10
I	-	-	7	2	1	-	12	2
X	5	5	7	-	2	2	2	-
No Rating	7	6	5	11	6	8	5	7

Table 67

Interrater Reliabilities and Summary of Ratings
Module IXb, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	9	f	7	2	-	8	f	8	-	-
		%	78	22	-		%	100	-	-
I, O_1		f					f			
		%					%			
I, O_2		f					f			
		%					%			
S, O_1		f					f			
		%					%			
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

NO OBSERVER RATINGS

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	9	-	-	8	8	-	-
I	2	-	-	-	-	-	-	-
X	-	-	-	-	1	-	-	-
No Rating	1	1	10	10	1	2	10	10

Table 68

Interrater Reliabilities and Summary of Ratings
Module IXb, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	7	3	-	9	f	6	3	0
		%	70	30	-		%	67	33	-
I, O_1		f					f			
		%					%			
I, O_2		f					f			
		%					%			
S, O_1		f					f			
		%					%			
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

NO OBSERVER RATINGS

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	8	-	-	7	6	--	-
I	3	2	-	-	2	1	-	-
X	-	-	-	-	-	-	-	-
No Rating	-	-	10	10	1	3	10	10

Table 69

Interrater Reliabilities and Summary of Ratings
Module IXb, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	[redacted]	A	D_1	D_2	n	[redacted]	A	D_1	D_2
I, S		f					f			
		%					%			
I, O_1		f					f			
		%					%			
I, O_2		f					f			
		%					%			
S, O_1		f				NO RATINGS				
		%								
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C								
I					RATINGS			
X				NO				
No Rating								

Table 70

Interrater Reliabilities and Summary of Ratings
Module IXb, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S		f					f			
		%					%			
I, O_1		f					f			
		%					%	NO RATINGS		
I, O_2		f					f			
		%					%			
S, O_1		f					f			
		%					%			
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C								
I					NO RATINGS			
X								
No Rating								

Table 71

Interrater Reliabilities and Summary of Ratings
Module IXb, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	15	f	14	1	-	15	f	15	-	-
		%	93	7	-		%	100	-	-
I, O_1		f					f			
		%					%			
I, O_2		f					f			
		%					%			
S, O_1		f					f			
		%					%			
S, O_2		f					f			
		%					%			
O_1, O_2		f					f			
		%					%			

NO OBSERVER RATINGS

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	13	12	-	-	15	15	-	-
I	-	1	-	-	-	-	-	-
X	2	2	-	-	-	-	-	-
No Rating	4	4	19	19	4	4	19	19

Table 72

Interrater Reliabilities and Summary of Ratings
Module X, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	10	-	-	10	f	10	-	-
		%	100	-	-		%	100	-	-
I, O_1	10	f	5	4	1	10	f	9	1	-
		%	50	40	10		%	90	10	-
I, O_2	10	f	6	3	1	10	f	8	2	-
		%	60	30	10		%	80	20	-
S, O_1	10	f	5	4	1	10	f	9	1	-
		%	50	40	10		%	90	10	-
S, O_2	10	f	6	3	1	10	f	8	2	-
		%	60	30	10		%	80	20	-
O_1, O_2	10	f	9	1	-	10	f	9	1	-
		%	90	10	-		%	90	10	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	10	10	5	6	10	10	9	8
I	-	-	4	3	-	-	1	2
X	-	-	1	1	-	-	-	-
No Rating	-	-	-	-	-	-	-	-

Table 73

Interrater Reliabilities and Summary of Ratings
Module X, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	7	3	-	10	f	9	1	-
		%	70	30	-		%	90	10	-
I, O_1	10	f	4	5	1	10	f	4	6	-
		%	40	50	10		%	40	60	-
I, O_2	10	f	7	3	-	10	f	3	7	-
		%	70	30	-		%	30	70	-
S, O_1	10	f	5	4	1	10	f	5	5	-
		%	50	40	10		%	50	50	-
S, O_2	10	f	8	2	-	10	f	4	6	-
		%	80	20	-		%	40	60	-
O_1, O_2	10	f	7	2	1	10	f	7	3	-
		%	70	20	10		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	6	7	6	7	9	10	5	4
I	3	2	2	2	1	-	5	6
X	1	1	2	1	-	-	-	-
No Rating	-	-	-	-	-	-	-	-

Table 74

Interrater Reliabilities and Summary of Ratings
Module X, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	9	f	5	4	-	8	f	5	3	-
		%	56	44	-		%	63	38	-
I, O_1	9	f	6	3	-	8	f	6	2	-
		%	67	33	-		%	75	25	-
I, O_2	9	f	5	4	-	8	f	4	4	-
		%	56	44	-		%	50	50	-
S, O_1	10	f	5	5	-	9	f	6	3	-
		%	50	50	-		%	67	33	-
S, O_2	10	f	6	3	1	9	f	6	3	-
		%	60	30	10		%	67	33	-
O_1, O_2	10	f	6	4	-	10	f	8	2	-
		%	60	40	-		%	80	20	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	4	7	5	6	5	8	6	6
I	5	2	5	3	3	-	4	4
X	-	1	-	1	-	1	-	-
No Rating	1	-	-	-	2	1	-	-

Table 75

Interrater Reliabilities and Summary of Ratings Module X, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	6	4	-	10	f	7	2	1
		%	60	40	-		%	70	20	10
I, 0_1	10	f	6	4	-	10	f	7	2	1
		%	60	40	-		%	70	20	10
I, 0_2	10	f	6	4	-	10	f	7	3	-
		%	60	40	-		%	70	30	-
S, 0_1	10	f	4	6	-	10	f	6	3	1
		%	40	60	-		%	60	30	10
S, 0_2	10	f	5	4	1	10	f	6	3	1
		%	50	40	10		%	60	30	10
0_1, 0_2	10	f	6	4	-	10	f	8	2	-
		%	60	40	-		%	80	20	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	5	4	5	9	7	6	8	10
I	4	4	4	-	3	3	2	-
X	1	2	1	1	-	1	-	-
No Rating	-	-	-	-	-	-	-	-

Table 76

Interrater Reliabilities and Summary of Ratings
Module X, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	12	f	9	3	-	13	f	11	2	-
		%	75	25	-		%	85	15	-
I, O_1	10	f	6	4	-	11	f	6	5	-
		%	60	40	-		%	55	45	-
I, O_2	10	f	6	4	-	11	f	10	1	-
		%	60	40	-		%	91	9	-
S, O_1	11	f	4	7	-	11	f	4	7	-
		%	36	64	-		%	36	64	-
S, O_2	11	f	3	8	-	11	f	8	3	-
		%	27	73	-		%	73	27	-
O_1, O_2	11	f	10	4	-	14	f	10	4	-
		%	71	29	-		%	71	29	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	10	11	5	5	11	10	6	9
I	2	1	8	8	1	2	8	4
X	-	1	2	1	1	1	1	1
No Rating	7	6	4	5	6	6	4	5

Table 77

Interrater Reliabilities and Summary of Ratings
Module XI, Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	9	f	8	1	-	10	f	9	1	-
		%	89	11	-		%	90	10	-
I, 0_1	9	f	6	2	1	10	f	6	4	-
		%	67	22	11		%	60	40	-
I, 0_2	9	f	5	4	-	9	f	7	2	-
		%	56	44	-		%	78	22	-
S, 0_1	9	f	6	3	-	10	f	5	5	-
		%	67	33	-		%	50	50	-
S, 0_2	9	f	6	3	-	9	f	6	3	-
		%	67	33	-		%	67	33	-
0_1, 0_2	10	f	8	2	-	9	f	8	1	-
		%	80	20	-		%	89	11	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	0_1	0_2	I	S	0_1	0_2
C	9	8	7	6	8	9	5	6
I	-	1	2	4	1	-	5	3
X	-	-	1	-	1	1	-	-
No Rating	1	1	-	-	-	-	-	1

Table 78

Interrater Reliabilities and Summary of Ratings
Module XI, Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	9	f	9	-	-	10	f	8	2	-
		%	100	-	-		%	80	20	-
I, O_1	10	f	7	3	-	10	f	7	3	-
		%	70	30	-		%	70	30	-
I, O_2	8	f	6	2	-	10	f	10	-	-
		%	75	25	-		%	100	-	-
S, O_1	9	f	6	3	-	10	f	7	3	-
		%	67	33	-		%	70	30	-
S, O_2	8	f	6	2	-	10	f	8	2	-
		%	75	25	-		%	80	20	-
O_1, O_2	8	f	7	1	-	10	f	7	3	-
		%	88	13	-		%	70	30	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	8	8	5	6	9	9	6	9
I	-	-	3	2	1	1	4	1
X	2	1	2	-	-	-	-	-
No Rating	-	1	-	2	-	-	-	-

Table 79

Interrater Reliabilities and Summary of Ratings
Module XI, University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	8	f	6	2	-	9	f	7	2	-
		%	75	25	-		%	78	22	-
I, O_1	8	f	7	1	-	9	f	7	2	-
		%	88	13	-		%	78	22	-
I, O_2	8	f	7	1	-	9	f	7	2	-
		%	88	13	-		%	78	22	-
S, O_1	8	f	6	[illegible]	1	9	f	7	2	-
		%	75	13	13		%	78	22	-
S, O_2	8	f	6	1	1	9	f	7	2	-
		%	75	13	13		%	78	22	-
O_1, O_2	10	f	10	-	-	10	f	10	-	-
		%	100	-	-		%	100	-	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	7	6	8	8	6	8	8	8
I	1	1	2	2	3	1	2	2
X	-	1	-	-	-	-	-	-
No Rating	2	2	-	-	1	1	-	-

Table 80

Interrater Reliabilities and Summary of Ratings
Module XI, University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	5	5	-	10	f	9	1	-
		%	50	50	-		%	90	10	-
I, O_1	10	f	5	5	-	10	f	8	1	1
		%	50	50	-		%	80	10	10
I, O_2	10	f	5	5	-	10	f	9	1	-
		%	50	50	-		%	90	10	-
S, O_1	10	f	10	-	-	10	f	9	-	1
		%	100	-	-		%	90	-	10
S, O_2	10	f	9	-	1	10	f	10	-	-
		%	90	-	10		%	100	-	-
O_1, O_2	10	f	9	-	1	10	f	9	-	1
		%	90	-	10		%	90	-	10

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	5	9	9	10	9	10	9	10
I	5	-	-	-	1	-	-	-
X	-	1	1	-	-	-	1	-
No Rating	-	-	-	-	-	-	-	-

Table 81

Interrater Reliabilities and Summary of Ratings
Module XI, Clark College

Interrater Reliabilities

Pair of Raters	Trial 1					Trial 2				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	12	f	12	-	-	10	f	10	-	-
		%	100	-	-		%	100	-	-
I, O_1	12	f	10	1	1	11	f	11	-	-
		%	83	8	8		%	100	-	-
I, O_2	11	f	10	-	1	10	f	9	1	-
		%	91	-	9		%	90	10	-
S, O_1	12	f	10	1	1	11	f	10	1	-
		%	83	8	8		%	91	9	-
S, O_2	11	f	10	-	1	10	f	8	2	-
		%	91	-	9		%	80	20	-
O_1, O_2	13	f	12	1	-	13	f	12	1	-
		%	92	8	-		%	92	8	-

Summary of Ratings

Rating	Trial 1				Trial 2			
	I	S	O_1	O_2	I	S	O_1	O_2
C	9	9	10	11	11	11	12	11
I	-	-	2	1	-	-	2	3
X	3	3	2	1	-	-	-	-
No Rating	7	7	5	6	8	8	5	5

APPENDIX

H

Interrater Reliabilities and Summary of Ratings, on the Examination over Modules I and II by Field Test Group

Table 82

Interrater Reliabilities and Summary of Ratings
Examination on Modules I and II
Eastern Washington, Group 1

Pair of Raters	Examination Section														
	Carving					Finishing					Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	8	f	8	-	-	10	f	10	-	-	10	f	9	-	1
		%	100	-	-		%	100	-	-		%	90	-	10
I, O	8	f	5	3	-	10	f	5	5	-	10	f	7	3	-
		%	63	38	-		%	50	50	-		%	70	30	-
S, O	9	f	5	4	-	10	f	5	5	-	10	f	7	3	-
		%	56	44	-		%	50	50	-		%	70	30	-

Summary of Ratings

Rating	Examination Section								
	Carving			Finishing			Polishing		
	I	S	O	I	S	O	I	S	O
C	8	9	5	10	10	5	10	9	7
I	-	-	5	-	-	5	-	-	3
X	-	-	-	-	-	-	-	1	-
No Rating	-	-	-	-	-	-	-	-	-

Table 83

Interrater Reliabilities and Summary of Ratings
Examination on Modules I and II
Eastern Washington, Group 2

Pair of Raters	Examination Section														
	Carving					Finishing					Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	9	f	8	1	-	9	f	4	5	-	10	f	6	4	-
		%	89	11	-		%	44	56	-		%	60	40	-
I, O	10	f	7	3	-	10	f	3	7	-	10	f	1	9	-
		%	70	30	-		%	30	70	-		%	10	90	-
S, O	9	f	6	3	-	9	f	5	2	2	10	f	2	7	1
		%	67	33	-		%	56	22	22		%	20	70	10

Summary of Ratings

Rating	Examination Section								
	Carving			Finishing			Polishing		
	I	S	O	I	S	O	I	S	O
C	9	9	6	3	2	6	-	3	9
I	1	-	4	7	5	4	10	6	1
X	-	-	-	-	2	-	-	1	-
No Rating	-	1	-	-	1	-	-	-	-

Table 84

Interrater Reliabilities and Summary of Ratings
Examination on Modules I and II

University of Washington, Group 1

Pair of Raters	Examination Section														
	Carving					Finishing					Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	10	-	-	9	f	5	4	-	8	f	7	1	-
		%	100	-	-		%	56	44	-		%	88	13	-
I, O	10	f	4	5	1	9	f	4	5	-	8	f	5	3	1
		%	40	50	10		%	44	56	-		%	63	38	-
S, O	10	f	4	5	1	9	f	6	3	-	8	f	4	4	-
		%	40	50	10		%	67	33	-		%	50	50	-

Summary of Ratings

Rating	Examination Section								
	Carving			Finishing			Polishing		
	I	S	O	I	S	O	I	S	O
C	10	10	4	7	4	4	4	5	4
I	-	-	5	1	3	5	4	3	6
X	-	-	1	1	2	1	-	-	-
No Rating	-	-	-	1	1	-	2	2	-

Table 85

Interrater Reliabilities and Summary of Ratings
Examination on Modules I and II
University of Washington, Group 2

Pair of Raters	Examination Section														
	Carving					Finishing					Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	10	-	-	10	f	8	2	-	10	f	6	4	-
		%	100	-	-		%	80	20	-		%	60	40	-
I, O	10	f	8	2	-	10	f	7	3	-	10	f	7	3	-
		%	80	20	-		%	70	30	-		%	70	30	-
S, O	10	f	8	2	-	10	f	5	5	-	10	f	7	3	-
		%	80	20	-		%	50	50	-		%	70	30	-

Summary of Ratings

Rating	Examination Section								
	Carving			Finishing			Polishing		
	I	S	O	I	S	O	I	S	O
C	10	10	8	9	7	8	8	7	7
I	-	-	2	1	3	2	2	2	3
X	-	-	-	-	-	-	-	-	-
No Rating	-	-	-	-	-	-	-	1	-

Table 86

Interrater Reliabilities and Summary of Ratings
Examination on Modules I and II
Clark College

Pair of Raters	Examination Section														
	Carving					Finishing					Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	18	f	18	-	-	17	f	11	6	-	16	f	16	-	-
		%					%					%			
I, O	18	f	8	10	-	18	f	12	6	-	17	f	7	10	-
		%					%					%			
S, O	18	f	8	10	-	17	f	11	6	-	16	f	5	11	-
		%					%					%			

Summary of Ratings

Rating	Examination Section								
	Carving			Finishing			Polishing		
	I	S	O	I	S	O	I	S	O
C	18	18	8	13	9	7	15	15	6
I	-	-	10	5	8	11	2	2	12
X	-	-	-	-	-	-	-	-	-
No Rating	1	1	1	1	2	1	2	2	1

APPENDIX

I

Interrater Reliabilities and Summary of Ratings on the Examination over Modules III-VI, by Field Test Group

Table 87

Interrater Reliabilities and Summary of Ratings
Examination on Modules III-VI

Eastern Washington, Group 1

Pair of Raters	Examination Section									
	Finishing					Occlusion				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I,S	10	f	3	7	-	8	f	8	-	-
		%	30	70	-		%	100	-	-
I, O	9	f	5	4	-	*	f			
		%	56	44	-		%			
S, O	9	f	3	4	2	*	f			
		%	33	44	22		%			

Summary of Ratings

Rating	Examination Section					
	Finishing			Occlusion		
	I	S	O	I	S	O
C	3	6	1	8	8	-*
I	7	4	6	-	-	-*
X	-	-	2	-	-	-*
No Rating	-	-	1	2	2	-*

* no observer ratings

Table 88

Interrater Reliabilities and Summary of Ratings Examination on Modules III-VI

Eastern Washington, Group 2

Pair of Raters	Examination Section									
	Finishing					Occlusion				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I,S	10	f	5	5	-	10	f	5	5	-
		%	50	50	-		%	50	50	-
I, 0	10	f	2	8	-	*	f			
		%	20	80	-		%			
S, 0	10	f	5	5	-	*	f			
		%	50	50	-		%			

Summary of Ratings

Rating	Examination Section					
	Finishing			Occlusion		
	I	S	0	I	S	0
C	-	4	8	4	9	-*
I	9	6	1	6	1	-*
X	1	-	1	-	-	-*
No Rating	-	-	-	-	-	-*

* no observer ratings

Table 89

Interrater Reliabilities and Summary of Ratings
Examination on Modules III-VI

University of Washington, Group 1

Pair of Raters	Examination Section									
	Finishing					Occlusion				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I,S	10	f	5	4	1	6	f	6	-	-
		%	50	40	10		%	100	-	-
I, 0	10	f	5	4	1	*	f			
		%	50	40	1		%			
S, 0	10	f	5	4	1	*	f			
		%	50	40	1		%			

Summary of Ratings

Rating	Examination Section					
	Finishing			Occlusion		
	I	S	0	I	S	0
C	3	2	3	8	6	-*
I	4	4	4	-	-	-*
X	3	4	3	-	-	-*
No Rating	-	-	-	2	4	-*

* no observer ratings

Table 90

Interrater Reliabilities and Summary of Ratings Examination on Modules III-VI

University of Washington, Group 2

Pair of Raters	Examination Section									
	Finishing					Occlusion				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I,S	8	f	6	2	-	7	f	7	-	-
		%	75	25	-		%	100	-	-
I, O	7	f	4	2	1	*	f			
		%	57	29	14		%			
S, O	7	f	3	3	1	*	f			
		%	43	43	14		%			

Summary of Ratings

Rating	Examination Section					
	Finishing			Occlusion		
	I	S	O	I	S	O
C	3	3	4	7	8	[illegible]
I	4	4	3	-	-	-*
X	1	1	-	-	-	-*
No Rating	2	2	3	3	2	-*

* no observer ratings

Table 91

Interrater Reliabilities and Summary of Ratings
Examination on Modules III-VI

Clark College

Pair of Raters	Examination Section									
	Finishing					Occlusion				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I,S	16	f	13	2	1	12	f	12	-	-
		%	81	13	6		%	100	-	-
I, 0	16	f	7	8	1	*	f			
		%	44	50	6		%			
S, 0	16	f	7	8	1	*	f			
		%	44	50	6		%			

Summary of Ratings

Rating	Examination Section					
	Finishing			Occlusion		
	I	S	0	I	S	0
C	3	5	3	13	13	-*
I	7	7	9	1	1	-*
X	6	4	3	-	-	-*
No Rating	3	3	4	5	5	-*

APPENDIX

J

Interrater Reliabilities and Summary of Ratings on the Final Examination, by Field Test Group

Table 92

Interrater Reliabilities and Summary of Ratings
Final Examination
Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Examination Section									
	Class I									
	Carving					Finishing & Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	5	3	2	10	f	10	-	-
		%	50	30	20		%	100	-	-
I, 0	10	f	3	6	1	10	f	-	9	1
		%	30	60	10		%	-	90	10
S, 0	10	f	4	5	1	10	f	-	9	1
		%	40	50	10		%	-	90	10

Summary of Ratings

Rating	Examination Section					
	Class I					
	Carving			Finishing & Polishing		
	I	S	0	I	S	0
C	8	7	2	10	10	-
I	2	1	6	-	-	9
X	-	2	2	-	-	1
No Rating	-	-	-	-	-	-

Table 92 (continued)

Interrater Reliabilities and Summary of Ratings
Final Examination
Eastern Washington, Group 1

Interrater Reliabilities

Pair of Raters	Examination Section														
	Class II										Class III				
	Carving					Finishing & Polishing					Finishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	5	5	-	9	f	5	2	2	10	f	6	3	1
		%	50	50	-		%	56	22	22		%	60	30	10
I, 0	9	f	2	4	3	9	f	3	3	3	10	f	4	3	3
		%	22	44	33		%	33	33	33		%	40	30	30
S, 0	9	f	1	7	1	9	f	3	3	3	10	f	4	3	3
		%	11	78	11		%	33	33	33		%	40	30	30

Summary of Ratings

Rating	Examination Section								
	Class II						Class III		
	Carving			Finishing & Polishing			Finishing		
	I	S	0	I	S	0	I	S	0
C	5	3	-	6	7	-	4	6	-
I	4	5	4	0	2	3	2	1	3
X	1	2	5	3	-	6	4	3	7
No Rating	-	-	1	1	1	1	-	-	-

Table 93

Interrater Reliabilities and Summary of Ratings
Final Examination
Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Examination Section									
	Class I									
	Carving					Finishing & Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	7	7	-	8	f	7	1	-
		%	70	30	-		%	88	13	-
I, O	10	f	9	1	-	8	f	8	-	-
		%	90	10	-		%	100	-	-
S, O	10	f	6	4	-	8	f	7	1	-
		%	60	40	-		%	88	13	-

Summary of Ratings

Rating	Examination Section					
	Class I					
	Carving			Finishing & Polishing		
	I	S	O	I	S	O
C	-	-	1	-	1	-
I	8	7	7	8	7	8
X	2	2	2	-	2	2
No Rating	-	-	-	2	-	-

Table 93 (continued)

Interrater Reliabilities and Summary of Ratings
Final Examination

Eastern Washington, Group 2

Interrater Reliabilities

Pair of Raters	Examination Section														
	Class II										Class III				
	Carving					Finishing & Polishing					Finishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	8	f	3	3	2	*	f				10	f	3	4	3
		%	38	38	25		%					%	30	40	30
I, O	6	f	2	3	1	*	f				10	f	8	2	-
		%	33	50	17		%					%	80	20	-
S, O	6	f	2	4	-	*	f				10	f	3	6	1
		%	33	67	-		%					%	30	60	10

* no ratings available

Summary of Ratings

Rating	Examination Section								
	Class II						Class III		
	Carving			Finishing & Polishing			Finishing		
	I	S	O	I	S	O	I	S	O
C	4	1	-	-	-	-	1	3	-
I	2	5	4	-	-	2	4	4	6
X	2	2	3	-	-	5	5	3	4
No Rating	2	2	3	10	10	3	-	-	-

Table 94

Interrater Reliabilities and Summary of Ratings
Final Examination
University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Examination Section									
	Class I									
	Carving					Finishing & Polishing				
	n		A	D_1	D_2	n		A	D_1	D_2
I, S	10	f	5	5	-	9	f	4	5	-
		%	50	50	-		%	44	56	-
I, O	10	f	5	3	2	10	f	7	3	-
		%	50	30	20		%	70	30	-
S, O	10	f	5	4	1	9	f	5	4	-
		%	50	40	10		%	56	44	-

Summary of Ratings

Rating	Examination Section					
	Class I					
	Carving			Finishing & Polishing		
	I	S	O	I	S	O
C	2	3	4	2	3	2
I	4	3	5	4	5	7
X	4	4	1	4	1	1
No Rating	-	-	-	-	-	-

Table 94 (continued)

Interrater Reliabilities and Summary of Ratings
Final Examination
University of Washington, Group 1

Interrater Reliabilities

Pair of Raters	Examination Section														
	Class II										Class III				
	Carving					Finishing & Polishing					Finishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	6	4	1	10	f	6	3	1	10	f	6	4	-
		%	60	40	-		%	60	30	10		%	60	40	-
I, O	10	f	5	5	-	10	f	5	5	-	10	f	4	5	1
		%	50	50	-		%	50	50	-		%	40	50	10
S, O	10	f	5	5	-	10	f	3	6	1	10	f	6	2	2
		%	50	50	-		%	30	60	10		%	60	20	20

Summary of Ratings

Rating	Examination Section								
	Class II						Class III		
	Carving			Finishing & Polishing			Finishing		
	I	S	O	I	S	O	I	S	O
C	2	2	1	1	4	1	2	3	3
I	4	4	7	4	1	7	2	4	4
X	4	4	2	5	5	2	6	3	3
No Rating	-	-	-	-	-	-	-	-	-

Table 95

Interrater Reliabilities and Summary of Ratings
Final Examination

University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Examination Section									
	Class I									
	Carving					Finishing & Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	5	5	-	5	f	2	3	-
		%	50	50	-		%	40	60	-
I, O	10	f	4	5	1	6	f	2	4	-
		%	40	50	10		%	33	67	-
S, O	10	f	6	4	-	9	f	5	4	-
		%	60	40	-		%	56	44	-

Summary of Ratings

Rating	Examination Section					
	Class I					
	Carving			Finishing & Polishing		
	I	S	O	I	S	O
C	6	5	4	4	5	1
I	3	4	6	2	4	9
X	1	1	-	-	-	-
No Rating	-	-	-	4	1	-

Table 95 (continued)

Interrater Reliabilities and Summary of Ratings Final Examination

University of Washington, Group 2

Interrater Reliabilities

Pair of Raters	Examination Section														
	Class II										Class III				
	Carving					Finishing & Polishing					Finishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	10	f	6	4	-	5	f	2	3	-	10	f	8	1	1
		%	60	40	-		%	40	60	-		%	80	10	10
I, O	10	f	2	8	-	6	f	3	3	-	10	f	4	2	4
		%	20	80	-		%	50	50	-		%	40	20	40
S, O	10	f	3	6	1	9	f	5	4	-	10	f	5	1	4
		%	30	40	10		%	56	44	-		%	50	10	40

Summary of Ratings

Rating	Examination Section								
	Class II						Class III		
	Carving			Finishing & Polishing			Finishing		
	I	S	O	I	S	O	I	S	O
C	3	5	2	4	4	2	3	3	4
I	4	2	8	2	3	8	2	1	-
X	3	3	-	-	2	-	5	6	6
No Rating	-	-	-	4	1	-	-	-	-

Table 96

Interrater Reliabilities and Summary of Ratings
Final Examination
Clark College

Interrater Reliabilities

Pair of Raters	Examination Section									
	Class I									
	Carving					Finishing & Polishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	14	f	10	4	-	11	f	9	2	-
		%	71	29	-		%	82	18	-
I, O	14	f	4	9	1	11	f	1	9	1
		%	29	64	7		%	9	82	9
S, O	14	f	5	7	2	11	f	3	7	1
		%	36	50	14		%	27	64	9

Summary of Ratings

Rating	Examination Section					
	Class I					
	Carving			Finishing & Polishing		
	I	S	O	I	S	O
C	5	7	6	10	8	-
I	8	6	7	1	3	13
X	1	1	1	-	-	1
No Rating	5	5	5	8	8	5

Table 96 (continued)

Interrater Reliabilities and Summary of Ratings
Final Examination
Clark College

Interrater Reliabilities

Pair of Raters	Examination Section														
	Class II										Class III				
	Carving					Finishing & Polishing					Finishing				
	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2	n	▨	A	D_1	D_2
I, S	14	f	8	6	-	10	f	5	5	-	14	f	11	3	-
		%	58	42	-		%	50	50	-		%	78	22	-
I, O	14	f	4	10	-	11	f	1	10	-	14	f	1	9	4
		%	29	71	-		%	9	91	-		%	7	64	29
S, O	14	f	2	12	-	10	f	4	6	-	14	f	4	6	4
		%	14	86	-		%	40	60	-		%	29	42	29

Summary of Ratings

Rating	Examination Section								
	Class II						Class III		
	Carving			Finishing & Polishing			Finishing		
	I	S	O	I	S	O	I	S	O
C	10	8	2	10	6	-	13	11	1
I	4	4	12	1	4	14	1	2	8
X	-	2	-	-	-	-	-	1	5
No Rating	5	5	5	8	9	5	5	5	5

SECTION

III

Report of the Pilot Field Test
of
Seven ACORDE Modules

REPORT OF THE PILOT FIELD TEST OF SEVEN ACORDE MODULES

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Evaluation Project Director

Far West Laboratory for Educational
Research and Development

October 1973

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Chapter One

OVERVIEW OF THE PILOT FIELD TEST

Introduction

In early 1973 when the first few ACORDE modules were nearing completion in each of the production schools, the developers became concerned with the established time schedule of reporting field tests evaluation data to them. Originally, plans were to report data after field testing all of the modules. However, the developers felt they should have some field test feedback before completing all of the scheduled work. In response to this concern, a pilot field test of the first seven modules was planned and conducted by the evaluation project director of the Far West Laboratory during April-May of 1973. This report describes the procedures utilized and the results obtained in the pilot field test.

The purposes of the pilot field test were to determine:

1. Student ability and willingness to use the instructional material without help from the instructor.
2. Student success in achieving the objectives of the modules.
3. Interrater reliability (student, instructor, developer, and evaluator) when applying the established criteria to student products.
4. Student, instructor, and evaluator estimates of the effectiveness of the components of the instructional materials (student syllabus, motion pictures, learning activities, special instruments, etc.).
5. Learning environment requirements for successful use of the course.
6. The nature and extent of data collection practical for subsequent field testing of all the modules.

The evaluation design (Figure 1) has four related areas in which the purposes of the pilot field test were addressed: they are instructional materials, student products, teaching-learning environment and evaluation processes. (See Figure 1, page 2.)

Figure I

Evaluation Design For the Pilot Field Test

1. INSTRUCTIONAL MATERIALS (SYLLABUS, INSTRUCTOR SYLLABUS, FILMS, ETC.) EVALUATED BY: students instructors evaluation team	2. STUDENT PRODUCTS EVALUATED BY: student (self-evaluation) instructors developers evaluation team dentists
3. TEACHING-LEARNING ENVIRONMENT EVALUATED BY: students developer instructor project director	4. EVALUATION PROCESS EVALUATED BY: developer project director Dental Health Center instructors

1. Instructional materials - were evaluated by the students who used them, the instructors assigned to the students in the field test, and at least three members of the Evaluation Team. Each module was read by the evaluation project director, a dental auxiliary teacher, and a dentist who is an instructor.

2. Student products - were evaluated in the classroom first by the student, then by the instructor, and finally by the developer. After the field test, two dental instructors evaluated each student's Class I Occlusal Amalgam restoration. All evaluations were done independently.

3. Teaching/Learning environment - information relating to the teaching/learning environment was contributed by students, developers, instructors, and members of the Evaluation Team.

4. Evaluation process - was concerned with the materials of the module, student learning, and the evaluation process itself. Again, all participants, students, developers, instructors, and the Evaluation Team had a role to fulfill.

Data Collection Sources

The data and information were collected by questionnairs, interviewers, trained observers, photography, video tape recording, casual observations, the noting of informal comments, evaluation of student products, examination of the used syllabi, and comparison of the syllabi with the appropriate task analyses.

Field Test Sites, Students, Instructors and ACORDE Modules Tested

Figure 2, page 5, lists the field test sites, students, instructors and ACORDE modules which were included in the pilot field tests.

It was apparent on the first contact with potential field test sites, that it would not be possible to schedule one group of students to participate in the testing of all seven modules. Conflicting schedules, students' previous training in some or all of the tasks, and the ACORDE materials available dictated that the pilot field test sample would be drawn from two institutions. Although it is not yet legal to teach expanded duties to dental auxiliaries in California, San Francisco City College had received special permission from the California State Department to teach an experimental expanded duties curriculum on reversible procedures, therby making it possible to test the Restoration and Rubber Dam Modules there.

Ten students in the third semester of the two year dental auxiliary program at San Francisco City College (SFCC) participated in the testing of three of the ACORDE Restoration Modules. The ACORDE Rubber Dam Module was used in place of the usual SFCC rubber dam instructional materials and tested with ten first-year students.

Three Preparation Modules were tested at the Southwestern Indian Polytechnic Institute (SIPI) where expanded duties curricula are part of the regular program. The ten students who participated in the field test were selected by faculty. Five were students who would graduate in June 1973 as dental auxiliaries and five were experienced dental auxiliaries who had been carrying out restorative procedures under the direction of the dentist in charge for two to sixteen years at various Indian Reservation Clinics.

The two instructors at San Francisco City College, Doni Perez and Royce Pitc, are both Certified Dental Auxiliaries who hold A.A. degrees. Both are experienced in dental assisting in the private sector and have two years experience in teaching. Each has had some training in expanded duties and four-handed dentistry.

The Dental Director of SIPI, Gary Kellam, D.D.S., was the instructor at the Albuquerque test site.

The teaching-learning environment at the two schools was significantly different. At San Francisco City College a portable classroom with electricity but with no water, sinks or compressed air was converted into a temporary laboratory. At SIPI there were five fully equipped, modern operatories that were used by half of the group. The other students worked on a bench space adjacent to each operatory; manikins were bench mounted and portable lights were brought in.

Figure 2

Pilot Field Test Sites, Students, Instructors and ACORDE Modules Tested

San Francisco City College
Dental Assisting Program

Mrs. Doni Perez, Instructor
Ten third-semester students

Mrs. Royce Piro, Instructor
Ten first-semester students

Restoration Modules:

1. Class I Facial Pit Preparation for Amalgam
2. Class I Occlusal Preparation for ZOE and Amalgam
3. Class V Preparation for Silicate Cement
4. Rubber Dam Preparation, Application and Removal

Southwest Indian Polytechnic Institute
Albuquerque, New Mexico

Dr. Gary Kellam, Instructor
Five graduating dental auxiliary students
Five dental auxiliary students experienced in expanded duties

Preparation Modules:

1. Class I Facial Pit for Amalgam
2. Class I Occlusal for Amalgam
3. Class V for Silicate Cement

Conduct of Field Test

The field test was conducted by the Far West Laboratory with assistance from personnel of the sponsoring agency, the Dental Health Center, and the developers from the three production schools.

The Far West Laboratory and the Dental Health Center contacted potential institutions and carried out all of the detailed planning. The Dental Health Center ordered all of the supplies and equipment required and took the responsibility for setting up the learning environment. As previously noted, a portable classroom at San Francisco City College was converted into a laboratory setting by bringing in tables, manikins, chairs, lights portable laboratory engines, etc. It was makeshift, but it worked and is illustrative of what can be done when money is limited but motivation is high, and energies unlimited.

The Evaluation Project Director developed the plan and forms for evaluating student learning, the effectiveness of the instructional materials and the opinions of the students and the instructors regarding the various facets of the instructional materials. Also the Evaluation Team collected and synthesized the data, delivered an oral presentation of the findings to the developers, and prepared this report.

The developers provided copies of the printed instructional materials, a set of instructional films, specially designed instruments, model preparations, and pre-cut preparations in the ivorine teeth for students learning restorative processes. In addition, during the conduct of the pilot field test, the developers made themselves available to answer questions and to participate in the evaluation of student products.

See Figure 3 below for a listing of the modules which were field tested, and the schools which produced them.

Figure 3

Modules and Producing Schools

Schools	Modules
1. University of California, Los Angeles	1. Restoration of a Class I Facial Preparation for Amalgam
	2. Restoration of a Class I Occlusal Preparation for ZOE and Amalgam
2. State University of New York	1. Rubber Dam
	2. Restoration of a Class V Preparation for Unfilled Resin
	3. Instrument Grasp nomenclature and chairside positions (reference for students)
3. University of Florida	1. Cavity Preparation for Amalgam
	2. Class I Occlusal Cavity Preparation for Amalgam
	3. Class V Cavity Preparation for Unfilled Resin

Restoration Modules were tested in San Francisco City College during the week of May 7, 1973, and the Preparation Modules were tested at Southwestern Indian Polytechnic Institute in Albuquerque the week of May 14, 1973.

Chapter Two

STUDENT REACTIONS TO INSTRUCTIONAL MATERIALS AND SUMMARY OF SUCCESS IN MEETING MODULE CRITERIA

The results of the pilot field test are reported in several sections. The first section summarizes the students' reactions to the instructional materials, the second section reports student success in meeting performance criteria, the third section summarizes the analysis of the components of modules, and the fourth section enumerates some educational-philosophical discrepancies, institutional concerns, and observations of the Evaluation Team.

Student Evaluation of the Instructional Materials

At the completion of the testing of each module, students were asked to evaluate the components of the module (student syllabus, pictures in syllabus, motion pictures, criteria, self-evaluation procedures, objectives, self-instruction) on a five-point semantic differential scale. In addition to the rating scale, students were given space to write in any comments they wished to make. Sample forms may be found in Appendix A. After the field test was completed, the evaluation director held three group discussions: one with the students at SIPI*, and one with the students at SFCC** who used the module on Rubber Dam. Only the students and the project evaluator took part in these discussion sessions. All other personnel were excluded. As will become apparent, there are some discrepancies between observations made during classtime, what the students said during the discussion and what the students recorded on their evaluation forms.

The results of the student evaluation of the seven modules are grouped by module component. When generalizations do not apply to all modules, exceptions by module title are reported.

Student syllabus. In general, most students said in the discussions and on the evaluation forms that the syllabi were easy to read, that they could follow the directions and dental terms were adequately explained.

In reality, the students had quite a lot of trouble following the directions. This is verified by the observations of the instructors, the developers and the project director who noticed that the students did not proceed through the syllabi and the tasks as the developers had intended

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* Southwest Indian Polytechnic Institute

** San Francisco City College

The learning activities of three Preparation Modules were organized in a repetitive pattern so the students improved in their ability to follow the directions once they understood the pattern. Of the various learning exercises one particular measuring exercise in these modules showed a low level of student success.

During the discussion sessions the students suggested that directions should be separated from the informational parts of the text and that it would be helpful if directions were capitalized or italicized. Directions refer to any instructions given to the student which require her to do something (e.g., read the syllabus, put on the rubber dam, etc.).

In some of the syllabi there were a lot of blanks to fill in. While the students didn't object to this generally, they objected vigorously to recording time used to complete a task in the Class I Facial Pit and Class I Occlusal Restoration Modules.

The Rubber Dam Module is a programmed text in which the student fills in several blanks per page. While the reaction to the mode of learning was not negative on the evaluation forms, the students in discussion said they felt that the constant request for verbatim answers was unreasonable.

Students generally objected to reading the syllabus in the operatory/laboratory. They all felt that practicing the task would have been more profitable if they could have read the material prior to coming to class. The students at SIPI felt they should not be using "clinic time" for reading.

Students suggested that the blocks used in the Cavity Preparation Modules would be easier to work on if they were wider and not so long.

Pictures in student syllabus. The students evaluated the pictures as being adequate in number, good in detail, and helpful in learning the task. Exceptions were the black and white pictures in a restoration module which were intended to portray "blue and red marks" indicating whether occlusion was in or out. In addition, students commented adversely on the quality of some of the drawings used to explain the criteria for cavity preparations, and the placement of some pictures in the Appendix rather than in the body of the text.

Motion pictures. Data from the evaluation forms indicate that students reacted very positively to the motion pictures; they rated them interesting, useful in learning the task, and of high technical quality. In discussion, however, students commented on the inconsistency of four handed dentistry principles demonstrated in the film, versus the syllabi directions to work alone in the classroom.

Some alternative procedures shown in the Rubber Dam motion pictures that were not discussed in the text were distressful to the students; they said the films went too fast for beginners.

A few students commented that they wished they could get a better view of the inside of the cavity when the cutting of preparations was being demonstrated.

Criteria for task performance. The students generally evaluated the criteria positively. They thought them understandable, helpful in learning the task and useful for self-evaluation. The measurable criteria in the cavity preparation modules were the most useful to students.

On the negative side, the discussion with the students revealed that they had not internalized the criteria to the point of being able to discuss specifically what they were and the use they made of them.

Criteria were especially difficult in the evaluation of restorations, because neither the pictures in the syllabus nor the motion picture films was adequate in associating verbal statements with qualities of restorations. Students couldn't apply criteria such as "restoration simulates tooth anatomy of the tooth on the opposite side or the arch." The students strongly expressed their desire for physical models of restorations that both meet and fail to meet the criteria. Obviously a frame of reference is needed before students can successfully apply criteria and evaluate their own work.

Self-evaluation. The self-evaluation process was viewed by the students as a procedure that helped them learn the tasks and keep them abreast of their progress.

Since evaluation in the ACORDE materials is tied to the performance criteria, it is not surprising that self-evaluation procedures were much more successfully used in the Preparation Modules than in the Restoration Modules.

Objectives. While the students marked the evaluation form in a positive fashion, they were a bit more critical of the objectives in the discussions. They felt that in some of the restoration modules there was a lot of repetition. Generally, they objected to the format "you will . . . ." perhaps because of the authoritarian connotations of the phrase.

Self-Instruction

Most of the students liked working at their own pace, and were generally positive about working alone except where they felt four handed dentistry was essential.

Observation and student comment indicated they had problems with materials and equipment that were different from their previous learning experiences (e.g., triturators). When this occurred, the instructor had to provide assistance to the students.

Although students were directed by the teacher to seek answers to their questions in the text and film resources, about half of the students needed more help than they could get from those sources.

In discussion students expressed pleasure at being relatively independent and self-paced in learning the tasks, but definitely felt that the instructor should be available when help is needed. Too, they felt that some skills such as finger rests might be better learned from an instructor than from a film or book. Some students commented that they worked better with some deadlines.

Although no affective data were collected in a formal way, the project director-student discussions following the field test revealed that the students had gained appreciation for the work of the dentist and saw more meaning in and the necessity for dental auxiliaries performing tasks in a specified manner.

Student Success in Meeting Criteria

The purpose for evaluatin student success was three-fold. The first was the collection of developmental data that would aid the developers in refining the modules being tested and designing modules yet to be written. The second was to determine the levels of student success in meeting the performance criteria as evaluated by the student, the instructor and the developer. The third purpose was to determine how much and what kind of learning and performance data could be collected in the main field test.

Developmental Data

Developmental data were collected by having students and instructors complete a series of written forms, by holding discussions with students and instructors, and via unstructured observations of the evaluation project director and the developers.

Since the instructional materials were designed as self-instructions and required no instructor-student interaction, developmental data were collected by asking the student to submit her product to instructor review after each step (e.g., after placing copal varnish, after condensing, after finishing and after polishing). Instructions were given to students to invite the instructor to view her work at the end of each task, or exercise. A sample form may be found in Appendix B. Since a comprehensive report of all the developmental data would be very lengthy, only a few examples of some of the positive observations and some learning problems and their implications will be presented.* Hopefully, this will serve to give the reader a feeling for the types of developmental findings which resulted from the pilot field test.

It was found that one set of drawings in the Preparation Modules was particularly helpful in graphically portraying the shapes and size of the cavity, the angle of the bur to the tooth, and the successive movements of the bur to create a preparation that met the criteria.

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* Detailed discussions of developmental data were held between the Project Director and each of the Developers for their respective modules.

A review of data on students meeting the performance criteria reveals that very few students were able to meet the criteria related to the retention grooves in the Class V Cavity Preparation. Field observations, student comment, and an examination of the preparations indicated that the combination of the placement of the 212 cervical retractor, the location of the cavity, and contra-angle conventional speed handpiece made meeting the criteria an almost impossible task on the first attempt. On successive attempts, students improved in their performance. Observations and discussions with students indicated that improvement resulted when the student figured out that by lowering the preparation incisally, access was possible with the handpiece, and the retention grooves could be properly placed.

During discussions, students said that they were able to approach the cavity cutting with confidence because they had some lead-up activities in which to become familiar with the operation of the handpiece. Dental auxiliary students who had no training in finger rests and operator-patient chairside positions were observed working nearly free handed and frequently were seated on the wrong side of the manikin. The reference material proved not to be specific enough.

The data show that in the Rubber Dam Module, inversion was one of the more difficult tasks. On the first try, two students met the criteria; five were successful on the second try, one student required three tries and another four tries. This data suggests that students need more information about or understanding of the criteria and/or more practice in inverting or any combination of the above. An effective instructor could in short discussion with the student determine the nature of the problem and rectify it.*

In the rubber dam application procedure, some students objected when the instructor noted (negatively) that the ligature was not placed. The fact that the ligature was not always placed as specified in the performance criteria was explained by the fact that if one procedure used (clamp placed after the rubber dam is applied) the ligature was not required; however, if the other procedure was followed (clamp placed before application of the rubber dam), the ligature was required. One procedure was described in the syllabus, and the other portrayed in the film.

The instructional materials will be revised so that the alternative procedures and the criteria related to each will be made explicit. Developer observation and subsequent evaluation of the restorations revealed that the students condensed the amalgam with too little pressure. Clearly the revised instructional materials and activities must assist the student in learning how much pressure is required to produce a well-condensed restoration.

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* See the Section on Recommendation where it is suggested that it is unwise to interpret the term "self-instructional" in a literal fashion, and that it is desirable to assign a role to the instructor in helping students overcome learning problems.

The above are but a few examples of the developmental data collected, presented to and discussed with the developers.

Student Success and Performance Criteria

Based on the task analyses done by the ACORDE National Task Analysis Committee, the developers established for each module a set of performance criteria; these are the basis for this part of the report. When the developers supplied evaluation forms they were used; however, when no final evaluation was planned the evaluation director supplied the evaluation materials. (See Appendix B.)

To those familiar with dental education, the problem of reliability in the evaluation of cavity preparations and restorations is a familiar one. With self-instructional materials in particular, the students' ability to critique his own work is of paramount importance since this is the major source of feedback during the learning process.

The evaluation problems and data collection procedures were somewhat different for preparation Modules than on the Restoration and Rubber Dam Modules, so the data will be presented separately.

Preparation Modules

Student success on the Preparation Modules is based on the cavity preparations cut during the posttest. For each of the three modules, instructions to students directed them to "practice this procedure as many times as you wish. When you feel you are ready to take the posttest please notify the instructor". Although the developer specified the need for unlimited student time to practice the procedures, the constraints of time, that is, student time, instructor time, and time the clinic facility could be made available, made it impossible to arrange for this condition. Some students finished before the assigned time was used up; others no doubt would have liked more practice time.

When a student completed a posttest preparation, she evaluated it by recording on a form that stated the criteria; subsequently, the instructor and developer evaluated the preparation. Each of the three evaluated the preparation independently from the operator's position, using the same lighting, while the tooth was mounted in the manikin head.

Table 1[*] presents a correlation matrix of ratings between the student, instructor, and the two developers for the student's performance on the Class I Facial Pit Cavity Preparation. It can be seen from Table 1 that the students had absolutely no accurate perception of their performance, as judged by the negative correlations of their ratings with the instructor and the two developers. The correlations of .37 and .53 between the instructor and the two developers show some degree of objectivity has been reached, but nevertheless leaves much to be desired. The correlation of .67 between the two developers shows a respectable level of agreement has been reached, but also leaves considerable room for improvement.

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[*] Correlations reported in Tables 1-3, and 5-6 are Pearson Product Moment Correlations, and for the most part are based on data from 10 students. From time to time, when a developer or instructor missed evaluating a student for one reason or another, correlations are based on an N of less than 10. The BMD 03D program was used to compute the correlations, and other data presented in Tables 1-7.

Table 1

Correlation Matrix of Ratings of Student Performance on the Class I Facial Pit Cavity Preparation

Variable Name	Student	Instructor	Developer 1	Developer 2
Student		-.22	-.16	-.29
Instructor			.37	.53
Developer 1				.67

Table 2

Correlation Matrix of Ratings of Student Performance on a Class I Occlusal Cavity Preparation

Variable Name	Student	Instructor	Developer
Student		.30	.77
Instructor			.36

Table 2 shows a substantial correlation of .77 between the students and developer in rating the former's performance on a Class I Occlusal Cavity Preparation. Apparently the instructor is not interpreting the criteria in the desired fashion, since his correlation with students and developers is somewhat low: .30 and .36 respectively.

Table 3

Correlation Matrix of Ratings of Student Performance on a Class V Cavity Preparation

Variable Name	Student	Instructor	Developer
Student		.20	.43
Instructor			.38

Table 3 shows a small degree of communality between ratings by evaluators of student performance on the Class V Cavity Preparation. However, students, instructors and developers are each interpreting the criteria in different ways, as can be seen from the low correlations of .20, .43, and .38 reported in Table 3.

Table 4

Student Performance on the Cavity Preparation Modules

Variable	Rates	Mean	Standard Deviation	Total Poss. Score	Students Who Met All Criteria
Class I Facial Pit Prep.	Student	1.10	0.74	2	3
Class I Facial Pit Prep.	Instructor	0.70	0.48	2	0
Class I Facial Pit Prep.	Developer 1	0.70	0.67	2	1
Class I Facial Pit Prep.	Developer 2	1.10	0.57	2	2
Class I Occlusal Prep.	Student	5.50	1.95	7	3
Class I Occlusal Prep.	Instructor	5.80	1.31	7	4
Class I Occlusal Prep.	Developer	5.90	1.79	7	4
Class V Cavity Prep.	Student	7.50	4.30	12	1
Class V Cavity Prep.	Instructor	9.30	1.94	12	1
Class V Cavity Prep.	Developer	6.70	3.09	12	1

Table 4 presents a statistical summary of student achievement data on the three cavity preparation modules which were presented to ten dental assisting students at Albuquerque. Performance on the Facial Pit Preparation, according to the statistics, was the poorest with an overall mean score of less than 50% achievement out of a total possible score of two criteria. The students improved considerably on the next module with a mean which ranged from 5.5 to 5.9 out of a total possible score of 7 criteria. Student performance on the Class V Cavity Preparation was not quite as good as before, with means which ranged from 6.7 to 9.3 out of a total possible score of 12 criteria. It can be seen from the last column of Table 4 that very few students achieved all the criteria on any of the modules. While the number of students meeting all criteria is not as high on this module as on the other two, it should be kept in mind that it is the most difficult of the three preparations, there are twelve criteria to be met, access with the handpiece was difficult, and time was limited.

Student success at meeting performance criteria of Restorative Modules must be viewed differently from student performance on the Preparation Modules because of the nature of the criteria, and the different testing procedures used by the developers. Posttests per se, were not included in Restoration and the Rubber Dam Modules; rather the product submitted at the end of practice period was used for evaluation. In contrast, evaluation procedures for the Preparation Modules were much more formal, as previously described.

Restoration Modules

Students attempted to restore three types of restorations: a) Class I Facial Pit Cavity Preparation, c) Class I Occlusal Cavity Preparation, and c) Class V Cavity Preparation.

There was no student self-evaluation of the Class I Facial Pit Cavity Preparation. The correlation in ratings of student performance on the module between the instructor and developer was -.52. Since the 5% level of significance for N=10 is .632, one might interpret the surprisingly high negative correlation as indicating zero agreement between the instructor and developer in evaluating the student performance on this module.

Table 5 presents the correlation matrix of ratings between the instructor, the developer, and two additional dentists on the Class I Occlusal Cavity Restoration. It can be seen from the Table that the instructor and developer agree with one another (r = .80), and the two dentists are in substantial agreement in their ratings (r = .64). However, the instructor-developer, and dentist 1 - dentist 2 are at odds with one another as evidenced by correlations ranging from -.20 to + .23.

Table 5

Correlation Matrix of Ratings of Student Performance on the Class I Occlusal Cavity Restoration

Variable Name	Instructor	Developer	Dentist 1	Dentist 2
Instructor		.80	.23	.00
Developer			-.20	.09
Dentist 1				.64

Table 6

Correlation Matrix of Ratings of Student Performance on the Class V Cavity Restoration

Variable Name	Student	Instructor	Developer
Student		37	.37
Instructor			.34

Table 6 shows a low positive correlation of ratings of student performance on the Class V Cavity Restoration. Because of the lack of variance in the ratings of student performance on the Rubber Dam Module, it was not possible to calculate a correlation coefficient between the two rators for that module.

Table 7

Student Performance on the Restorative and the Rubber Dam Modules

Variable	Rators	Mean	Standard Deviation	Total Poss. Score	Students Who Met All Criteria
Class I Facial Pit Rest.	Instructor	1.66	1.12	3	2
	Developer	2.11	0.78	3	3
Cl. I Occl. Cav. Rest.	Instructor	3.67	1.87	7	0
	Developer	4.14	0.90	7	0
	Dent. 1	3.00	1.41	7	0
	Dent. 2	1.80	0.79	7	0
Class V Cav. Rest.	Student	3.33	1.32	4	7
	Instructor	2.11	0.93	4	1
	Developer	2.10	1.10	4	1
Rubber Dam	Instructor	11.00	0.00	11	10
	Develop.	10.70	0.48	11	7

Table 7 summarizes student achievement on the Restorative and Rubber Dam Modules. Student products were evaluated in relation to carving, finishing and polishing on the Class I Facial Pit Restoration. It can be seen from Table 7 that the developer had a different standard than the instructor in evaluating student performance on the Class I Facial Pit Restoration. The large standard deviation (relative to the mean scores) for the Class I Facial Pit Restoration indicates considerable variation by students in their achievement on that module.

There was some discrepancy in the ratings of student performance on the Class I Occlusal Cavity Restoration as can be seen from the mean ratings which range from 1.80 to 4.14. These mean scores indicate that student achievement on this module was in need of improvement. The module for the Class V Cavity Preparation included a student self-evaluation and instructor evaluation form that was to be used after the unfilled resin was placed, and after the restoration was completed. Student achievement on the Class V Cavity Restoration was about 50% as graded by the instructor and developer (2.11 and 2.10 out of a possible score of 4). The students were unfamiliar with the criteria and therefore non-critical, as evidenced by their mean self-evaluations of 3.33. Seven of the 10 students thought they had achieved all of the criteria, but the instructor and developer each felt that only one student achieved all of the criteria. A review of the data indicate that all of the students felt they had met the criteria for the restoration, the instructor evaluated one restoration as undercontoured, and the developer evaluated two restorations as overcontoured.

As measured by the statistics in Table 7, achievement on the Rubber Dam Module was high. Instructors felt that every student achieved all of the criteria, while the developer rated 7 out of 10 students as having achieved all of the criteria. The developmental data show, however, that none of the students met all of the criteria on the first try; 9 met all criteria on the third try; and one student required four tries. Since students were directed to request an evaluation only after they felt they had met all the criteria, it appears that the students did not have a clear understanding of the criteria.

Chapter Three

SUMMARY OF THE EVALUATION TEAM'S ANALYSIS OF THE COMPONENTS OF THE MODULES

As the Evaluation Team reviewed the first seven modules, it was apparent that each was quite different in the kind of information it contained, the format used, etc. Table 10 presents a summary of an analysis of the degree of consistency between modules. Many of the items need no explanation; however, concerns raised about some of the items warrant discussion.

While all of the developers listed objectives, the formats used to express the objectives and content varied markedly. For example, some were Mager-type objectives, others were not. Some were very long and included all the steps used to get to the finished product, while others were short and to the point. Some included affective objectives and others did not.

Criteria for task performance were included in all of the modules; however, in some modules the criteria were implicit within the written text and not to be found in a list. In addition, evaluation forms for student use were not generally available, even when the student was directed to evaluate his own work.

Lists of supplies and equipment were generally exhaustive; however, materials needed for an entire module had to be arrived at by going through several lists. It was recommended that a list of supplies and equipment for an entire module or even the course be placed in the instructor syllabus.

Two different positions were taken on the need for a posttest. One production center felt that the posttest is essential because the student must meet criteria "on demand"; the other centers felt that when the student produced a product that met the criteria, he should go on to the next task.

Directions to the instructors in four modules requested no interaction between instructor and student; in three modules it was suggested that some interaction between student and instructor take place.

Table 8

Analysis of Components of Modules*

	Preparation Modules			Restoration Modules			Prerequisite Module
	FP[1]	CL.I[2]	CL.V[3]	FP[1]	CL.I[2]	CL.V[3]	RD[4]
Table of Contents	x	x	x	x	x	x	no
Acknowledgements	x	x	x	x	x	x	no
References	no	no	no	x	x	no	no
Glossary of Terms	no	no	no	x	x	no	no
Objectives-behavioral/termina	/x	/x	/x	x/	x/	x/	x/
Objectives-cognitive/affective	/no	/no	/no	x/x	x/x	/no	x/no
List of criteria	x	x	x	no	no	x	no
List of equipment and supplies	x	x	x	x	x	arm. only	arm. only
Instructional package contents	x	x	x	no	no	no	no
Learner prerequisites	x	x	x	x	x	x	x
Procedures	x	x	x	x	x	x	x
Film narration	x	x	x	no	no	x	no
List of illustrations	no	no	no	x	x	no	no
Preface	no	no	no	/	/	no	no
Introduction	x	x	x	x	x	x	x
Posttest	x	x	x	no	no	no	no
Cognitive test	no	no	no	no	no	x	x
Evaluation forms student/instr.	no/x	no/x	no/x	no/time	no/time	x/x	no/no
Rationale for procedures	no	no	no	x	x	some	x
Operator position	no	no	no	x	no	no	no
Finger rest/instrument grasp	general info.			no	no	no	some
Mirror	no	no	no	no	no	no	no
Overview film	x	x	x	x	x	x	x
Single concept film	no	no	no	x	x	x	x
Student-instructor interaction	no	no	no	some	some	some	no
Instructor Syllabus	x	x	x	x	x	a letter	page of instruction

[1] Class I Facial Pit

[2] Class I Occlusal

[3] Class V

[4] Rubber Dam

*X - Denotes presence of the component to which reference is made
No - Denotes absence of the component to which reference is made

Chapter Four

EDUCATIONAL-PHILOSOPHICAL OBSERVATIONS AND PRACTICAL CONSIDERATIONS

The observations of the Evaluation Team (dentists, who are instructors, dental auxiliary teachers, and the evaluation project director) point up a series of educational-philosophical and operational problems and some inconsistencies that must be resolved before the remaining modules are completed and the next field test undertaken.

While the list of concerns may seem long, it should be remembered that students reacted generally favorably to the materials, to their experience with expanded duties' training, and that the students did achieve many of the criteria on which they were evaluated.

Educational-Philosophical Observations and Practical Considerations

1. ACORDE instructional materials were designed to be used in a functioning operatory. The instructors and the evaluators felt that this requirement would greatly limit the use of the instructional materials because few community colleges or dental schools for that matter can afford to purchase the equipment or use existing operatory space and time for this purpose. Additionally, it was felt that initial learning on a manikin in a laboratory setting would not impair successful achievement of the skills and knowledge required.

2. To resolve the discrepancy between four-handed dentistry techniques shown in the films, and, the directions in the syllabi for practicing the tasks on an individual basis, the Evaluation Team suggested that students work together on tasks where four-handed techniques were required. Additionally, some comments in the syllabi about the use of four-handed dentistry could mediate the gap between the films and the learning experience.

3. When the concept of self-instruction is pushed to the limit so that there is no student-instructor interaction, unnecessary problems arise. Students like self-direction but still feel the need for help on occasions. They applauded the removal of the instructor as the lecturer, but recommended a tutoring and evaluating role for the instructor.

4. The students, instructors and evaluators felt that the length of the learning increments were too short, (i.e., read a little, do one step, read a little more, do the next step, etc.) Observations of the students showed that they often disregarded the instructions of the developers and read an entire section and then carried out the entire procedure.

5. Students did not like reading in the operatory and suggested that they be given the materials to read before going to the operatory/laboratory to practice the procedure.

6. The instructors and the evaluators, in particular, felt that more rationale and background information should be added to the modules that had been produced without this material.

7. Both students and instructors were dissatisfied with their ability to apply the criteria in evaluating restorations. Clearly, such words as "smooth" and "marginal integrity" meant different things to different people. Students, instructors and evaluators strongly recommend that physical models be added to instructional packages as an aid to understanding of the criteria.

8. Instructors rejected as impractical the concept of unrestricted self-pacing that allows as much time as students need to reach criteria and complete the module. They also rejected the concept of students working "on their own time", that is, an open classroom in which students can work in an unscheduled fashion. Supply and equipment distribution, problems, requirements for instructors to be in attendance when students are working in a laboratory make this proposal almost impossible in the community college setting.

9. Providing students with equipment and space to review films whenever and as often as they chose seemed desirable educationally, but difficult to achieve without the purchase of cartridge-type projectors, space and checkout system.

10. Students, instructors and evaluators suggested that both information and learning experiences on finger rests, instrument grasps, operator-patient position and use of the mirror be incorporated into the modules or course since it is not part of the dental auxiliary's training. Conversely, rubber dam application and removal is part of the dental auxiliary's training and may not need so much emphasis.

11. Some of the evaluators questioned the advisability of using "special" measuring instruments for training students to cut cavities and achieve the original contour of a tooth with restorative material, since in practice the operator must rely on the instruments he uses as a measuring instrument. They felt that if "special" instruments were used, they should be limited to the first few modules. Subsequently, the standard instruments of dentistry should be utilized.

Operational Concerns

1. Instructors objected to the specificity of equipment and materials needed to conduct the course. They suggested that alternative equipment be listed and that the task lists of equipment and supplies be combined into a single module list. This would greatly expedite instructor ordering.

2. In-service training for the instructors who will use the ACORDE materials in the main field test needs planning, testing, and implementing, not only for this phase of development, but prior to the release of the materials to the public.

3. The instructors felt that the Instructor Syllabi needs to provide more practical help to the instructor. It was also suggested that only one instructor syllabus for the preparation modules and one for the restoration modules be developed.

4. Systematic planning should begin in the near future on course packaging and dissemination. Issues such as availability of special instruments, cost of the materials, etc., have to be resolved.

Chapter Five

RECOMMENDATIONS

Based on data analysis, feedback from students, instructors and consultants, observations of learning activities, instructional procedures and environmental factors, the following recommendations are made:

1. Assign instructional responsibilities as well as evaluation responsibilities to the instructor. Roles for the instructor should include assisting students in understanding the meaning and application of performance criteria, assisting with motor skills as needed, diagnosing learning problems, and providing instruction and/or activities to remediate the problems which have been identified.

2. Shift the learning environment from the operatory to the laboratory.

3. Examine some alternative procedures for developing student skills in applying criteria. Some possibilities include, student-instructor interaction, the use of physical models, and group practice exercises in evaluating the work of previous students.

4. Review restoration criteria to determine when and if evaluations should take place other than when the restoration is completed.

5. Include some background science information that explains on a general conceptual level the need for carrying out procedures as described, and the consequences that may occur if the procedure is not followed.

6. Include cognitive objectives as well as skill and product objectives.

7. Lengthen the learning increment; interrupt it less often with written material. Instruct the students to read about the entire procedure before beginning practice activities.

8. Produce visuals from the view of the operator. Research has demonstrated that motor skills are best learned from a subjective view.

9. Plan an in-service training component for instructors who are not dentists.

APPENDIX A

STUDENT EVALUATION FORM

PROJECT ACORDE

Pilot Evaluation

Student Evaluation Instrument

Module ______________________________

Date ______________________________

Below are the components of the module you have been studying. For each component, please complete the rating scales listed below it.

The Student Syllabus:

Easy to read	___	___	___	___	___	Hard to read
Easy to follow directions	___	___	___	___	___	Difficult to follow directions
Very helpful in learning the task	___	___	___	___	___	Not helpful in learning the task
Interesting reading	___	___	___	___	___	Dull reading
Like filling in blanks	___	___	___	___	___	Don't like filling in blanks
Dental terms well explained	___	___	___	___	___	Dental terms poorly explained

Pictures in the Student Syllabus:

Good detail	___	___	___	___	___	Poor detail
Helpful in learning the task	___	___	___	___	___	Not helpful in learning the task
Too many	___	___	___	___	___	Too few

Motion Pictures:

Interesting	___	___	___	___	___	Dull
Good explanation of task	___	___	___	___	___	Poor explanation of task
Good sound	___	___	___	___	___	Poor sound
Too many	___	___	___	___	___	Too few

Criteria for Task Performance:

Clear	___	___	___	___	___	Hard to understand
Helpful in learning the task	___	___	___	___	___	Not helpful in learning the task
Helpful in self-evaluation	___	___	___	___	___	Not helpful in self-evaluation

Self-evaluation:

Helped me learn	___	___	___	___	___	Did not help me learn
Helped me know "how I was doing"	___	___	___	___	___	Did not help me know "how I was doing"

Objectives:

Helped me know what I was going to learn	___	___	___	___	___	Did not help me know what was going to learn
Clear	___	___	___	___	___	Hard to understand
Too many in module	___	___	___	___	___	Too few in module

Self-Instruction.

Like working at my own pace	___	___	___	___	___	Do not like working at my own pace
Like working alone	___	___	___	___	___	Do not like working alone

Check one answer below to indicate how you felt about the frequency of self-evaluation.

____ asked to do it too often
____ asked to do it too seldom
____ neither too often or too seldom

Did you have enough forms for recording your self-evaluation?

____ yes
____ no, more were needed

Did you have enough supplies and equipment?

____ yes
____ no, more were needed

Did you like having instructor in the background?

____ yes
____ no, would have liked more interaction with instructor

Did you have to ask instructor for help?

____ yes
____ no
____ no, but could have used help

Please complete the following open-ended statements.

The part I liked best in this course:

The part I liked least:

In completing this module, I needed more:

In completing this module, I needed fewer (less):

If you are going to review this module, I would suggest:

Thank you for your help,

Project ACORDE Staff

APPENDIX B

INSTRUCTOR EVALUATION FORM
(Developmental Data Collection and Module Evaluation Form)

PROJECT ACORDE

Pilot Evaluation

Class I Occlusal Cavity Preparation for Amalgam

Instructor Evaluation Instrument

Student ______________________________

Date ______________________________

Exercise 2

Ask the student if he has met all of the objectives as stated and check (✓) his response in column marked "student". After the student has left, measure the cuts and record your observations.

Ivorine Blocks

✓ if criterion is met; X if criterion is not met.

	Example 1		Example 2	
	Student	Instructor	Student	Instructor
3 - 5 mm long				
2 - 2.5 mm deep				
1 - 1.5 mm wide				

Exercise 3

If student attempted the preparation, evaluate it and place the tooth in the envelope.

No student attempt ☐

✓ if criterion is met; X if criterion is not met.

Mesial pit depth	1.5 mm - 2.0 mm	
Center depth	2.0 mm - 2.5 mm	
Distal pit depth	1.5 mm - 2.0 mm	
Preparation width	1.5 mm	
Marginal ridges	1.5 mm	

Exercise 4

When the student asks for another tooth, give it to her. Before she removes it from the typodont, examine the preparation, put the tooth in the envelope, then record her problem as you see it.

First try ____________________

Second try ____________________

Third try ____________________

Fourth try ____________________

When the student indicates she has met the criteria, record your evaluation of it and put the tooth in the envelope.

✓ if criterion is met; X if criterion is not met.

Mesial pit depth	1.5 mm - 2.0 mm	
Center depth	2.0 mm - 2.5 mm	
Distal pit depth	1.5 mm - 2.0 mm	
Preparation width	1.5 mm	
Marginal ridges	1.5 mm	

Exercise 5

When the student asks for another tooth, give it to her. Before the tooth is removed from the typodont, examine the preparation, put the tooth in the envelope, then record her problem as you see it.

First try ____________________

Second try ____________________

Third try ____________________

Fourth try ____________________

When the student indicates she has met the criterion, record your evaluation of it and put the tooth in the envelope.

✓ if criterion is met; X if criterion is not met.

Mesial pit depth	1.5 mm - 2.0 mm	
Center depth	2.0 mm - 2.5 mm	
Distal pit depth	1.5 mm - 2.0 mm	
Preparation width	1.5 mm	
Marginal ridges	1.5 mm	

Posttest

When the student completes her posttest, have her record her evaluation on the form provided. Record your evaluation on a separate form.